MARKOVSKIY, F.T., kandidat tekhnicheskikh nauk, redaktor.

[Small and medium capacity water-power plants; reference manual] Gidroenergeticheskie ustanovki maloi i sredne:i moshchnosti; spravochnoe rukovodstvo. Kiev, Gos.nauchno-tekhn.izd-vo mashinostroit.lit-ry [Ukrainskoe otd-nie] 1952. 519 p. (MLRA 6:8)
(Hydroelectric power stations) (Electric power distribution)

1. MARKOVSKIY, F. T.; BEZKOROVAYNYY, G. P.

2. USSR (600)

4. Ukraine--Wind Power

7. Variants in the utilization of energy from the wind on the territory of the Ukrainian SSR, Trudy Inst. tepl. AN URSR, No. 6, 1952.

9. Monthly List of Russian Accessions, Library of Congress, April, 1953, Uncl.

1. MARKOVSKIY, F. T.

2. USSR (600)

4. Ukraine--Power Plants

7. Prospects for the development of local power supply systems in the Ukraine, Trudy inst. tepl. AN UkSSR, No. 6, 1952.

9. Monthly List of Russian Accessions, Library of Congress, April, 1953, Uncl.

MARKOVSKIY, F.T., kandidat tekhnicheskikh nauk

Potential use of lignite from the Dnieper Basin in supplying power to the South of the Ukraine S.S.R. Trudy Inst. tepl. AN URSR no.8:132-137 '52. (Ukraine--Power engineering) (MLRA 8:7)
(Dnieper Valley--Lignite)

1. MARKOVSKIY, F. T.; BEZKROVAYNYY, G. P.

2. USSR (600)

4. Wind Power - Ukraine

7. Variants in the utilization of energy from the wind on the territory of the Ukrainian SSR. Trudy Inst. tepl. AN URSR No. 6, 1953.

9. Monthly List of Russian Accessions, Library of Congress, April 1953. Unclassified.

MANKOVSKIY, F.T., kandidat tekhnicheskikh nauk; LANDSMAN, S.U., mladshiy nauchnyy sotrudnik.

Power efficiency indices in chemical treatment of lignite coal from the Dnieper Basin. Trudy Inst.tepl. AN URSR no.9:3-17 '53. (MIRA 8:6)
(Dnieper Valley--Lignite) (Power engineering)

MARKOVSKIY, F.T., red.

[Problems in rural electric power] Voprosy sel'skogo energosnabzheniia. Kiev, Akad.nauk USSR, 1956. 195 p.
(Rural electrification) (MIRA 13:8)

SOV/112-58-1-253

Translation from: Referativnyy zhurnal, Elektrotekhnika, 1958, Nr 1, p 36 (USSR)

AUTHOR: Markovskiy, F. T.

TITLE: Analytical Method of Loss Determination in Daily Regulation of Hydroelectric Stations (Analiticheskiy metod opredeleniya poter' sutochnogo regulirovaniya gidroelektrostantsiy)

PERIODICAL: V kn.: Vopr. sel'sk. energosnabzheniya Kiyev AN UkrSSR, 1956, pp 158-174

ABSTRACT: Causes of energy losses associated with daily regulation at hydroelectric stations are considered, and an analytical method of loss determination is offered. Procedure of choice of a calculated-load diagram instead of a natural-load diagram is explained in detail, and fundamental requirements of the calculation diagram are formulated. The suggested method of loss determination is based on the following: (1) separate determination of losses during steady-state water flow, of losses in headwater and in tailwater, of losses during the half-cycle of drawing the water from the reservoir, and of losses during the half-cycle of filling the water reservoir; (2) introduction,

Card 1/2

SOV/112-58-1-253

Analytical Method of Loss Determination in Daily Regulation of Hydroelectric . . .

into the analytical expressions for losses, of weighted mean values of efficiency over the half-cycles of drawdown and filling; (3) a linear relationship is assumed between the volume of reservoir water drawn and the change in upstream level. Analytical expressions are presented for determining discharge and for determining volume of drawdown. Loss determination by the above method can be accomplished by solving the following five simple equations: for losses in upstream water over the drawdown half-cycle; for upstream water losses over the filling half-cycle; for downstream water losses over the drawdown half-cycle; for downstream water losses over the filling half-cycle; and the same over the half-cycle of regulation. Transition from the power diagram to the discharge diagram and determination of estimated efficiency can be accomplished by means of successive approximations based on the operational characteristic of the hydroelectric station.

Yu. M. S.

AVAILABLE: Library of Congress

1. Power plants--Performance 2. Power plants--Analysis

Card 2/2

8(0) SOV/112-58-3-3762

Translation from: Referativnyy zhurnal. Elektrotekhnika, 1958, Nr 3, p 34 (USSR)

AUTHOR: Markovskiy, F. T.

TITLE: Planning Economic Loading of Hydro-Power Systems According to the "Regime Losses" Method (Proyektirovaniye ekonomichnykh rezhimov raboty gidroenergeticheskikh sistem po metodu "rezhimnykh poter'")

PERIODICAL: Tr. Kiyevsk. gidromelior. in-ta, 1956, Nr 5, pp 127-138

ABSTRACT: An analytical method is suggested for the optimum load division between hydroelectric plants on the basis of the minimum "regime losses" in the system or the maximum energy output. "Regime losses" means the losses caused by a deviation from uniform loading conditions which are optimum conditions for both the generating units and the distribution network. It is recommended that this method be used, because the incremental method used in modern planning practice meets with certain difficulties in the case of hydro plants. Formulae for computing daily-regulation losses for hydro plants with

Card 1/2

8(0) SOV/112-58-3-3762

Planning Economic Loading of Hydro-Power Systems According to the "Regime . . . .

independent water schedules are presented, as well as for a system comprising n hydro plants with independent water schedules. The above method can be used for plotting dispatcher's load curves that present the loading of each hydro plant as a function of the system load.

V.A.P.

Card 2/2

SHVETS, Ivan Trofimovich, akademik; BUKSHPUN, Il'ya Davidovich; KIRAKOVSKIY, Nikolay Feliksovich, dotsent; MARKOVSKIY, Filipp Titovich, kand. tekhn. nauk, dotsent; PERKOV, Vasiliy Gerasimovich, kand. tekhn. nauk, dotsent; ZOLOTAREV, T.L., doktor tekhn. nauk, prof., retsenzent; MIKLASHEVICH, G.P., inzh., retsenzent; RIKBERG, D.B., red.; GORNOSTAYPOL'SKAYA, M.S., tekhn. red.

[Electric power] Energetika. Moskva, Gos. nauchno-tekhn. izd-vo mashinostroit. lit-ry, 1961. 501 p. (MIRA 14:9)

1. Akademiya nauk USSR (for Shvets).
(Electric power) (Electric machinery)

MARKOVSKIY, F.T. [Markov'kyi, P.T.]; SELYAVIN, G.F. [Seliavin, H.F.]

Effect of errors made in the balancing tests of boilers on the accuracy of the plotting of characteristics concerning increments. Zbir.prats' Inst.tepl.AN URSR no.23:3-13 '61. (MIRA 15:2)

(Boilers--Testing)

MARKOVSKIY, F.T. [Markovs'kyi, P.T.]; SELYAVIN, G.F. [Seliavin, H.F.]

Steadiness of the energy characteristics of boiler units.
Zbir.prats' Inst.tepl.AN URSR no.23:13-22 '61. (MIRA 15:2)
(Boilers)

MARKOVSKIY, F.T.; TREGUB, A.P.; KRAVERS, A.D., kand. tekhn. nauk, dots., red.; ORLOVA, L.I., red.izd-va; PRUS'YAN, L.F., red.izd-va; SHCHETININA, L.V., tekhn. red.

[General electrical engineering] Obshchaia elektrotekhnika. Moskva, Mashgiz, 1963. 331 p. (MIRA 17:2)

LANDSMA., S.U.; MARKOVSKIY, F.T.; SINITSYNA, L.P.

Specific indices and regime characteristics for gas consumption in residential sectors of cities. Gaz. prom. 8 no.2:30-34 '63. (MIRA 17:8)

MARKOVSKIY, F.T.; SELYAVIN, G.F.; KHATAYEVICH, R.M.

Conditions of electric power consumption in the power system of the Ukraine. Energ. i elektrotekh. prom. no.3:50-54 Jl-S '62. (MIRA 18:11)

1. Institut teploenergetiki AN UkrSSR.

MARKOVSKIY, F.T., kand. tekhn. nauk; USIK, A.F., inzh.

Study of the economic efficiency of gas turbine systems with consideration of optimal parameters. Energ. i elektrotekh. prom. no.3:63-65 Jl-S '65. (MIRA 18:9)

KRYLOV, A.P., red.; AFANAS'YEVA, A.V., kand. tekhn.nauk, red.; BOCHKOV, Yu.P., doktor tekhn. nauk, red.; BRISMAN, A.A., red., kand. tekhn. nauk; BUCHIN, A.K., kand. ekon. nauk, red.; VIRNOVSKIY, A.S., doktor tekhn. nauk, prof., red.; ZHELTOV, Yu.P., kand. tekhn. nauk, red.; MARKSIMOV, M.I., kand. geol.-miner. nauk, red.; MARKOVSKIY, G.E., inzh., red.; MELIK-PASHAYEV, V.S., doktor geol.-miner. nauk, red.; NIKOLAYEVSKIY, N.M., doktor ekon. nauk, prof, red.; PETROVSKAYA, A.N., kand. geol.-miner. nauk, red.; PILATOVSKIY, V.P., doktor fiz.-mat. nauk, red.; ROZENBERG, M.D., doktor tekhn. nauk, red.; SAFRONOV, P.V., kand. tekhn. nauk, red

[Petroleum production; theory and practice. 196[illegible] yearbook] Dobycha nefti; teoriia i praktika. Ezhegodnik 1963. Moskva, Nedra, 1964. 302 p. (MIRA 17:9)

1. Chlen-korrespondent AN SSSR (for Krylov). 2. Vsesoyuznyy neftegazovyy nauchno-issledovatel'skiy institut (for Melik-Pashayev, Rozenberg). 3. Institut mekhaniki AN SSSR (for Nikolayevskiy).

14-57-6-11647

Translation from: Referativnyy zhurnal, Geografiya, 1957, Nr 6, p 7 (USSR)

AUTHOR: Markovskiy, G. V.

TITLE: Student Meteorologists Study the Weather (Izucheniye pogody v shkol'nom meteorologicheskom kruzhke)

PERIODICAL: V sb: Uchitelya geogr. o svoyey rabote. Moscow, Akad. pe. nauk RSFSR, 1955, pp 107-128

ABSTRACT: Bibliographic entry

Card 1/1

MARKOVSKIY, I., inzh.

Sling and crosspiece for raising girders. Prom. stroi. i inzh. soor. 4 no.1:53 Ja-F '63. (MIRA 16:3)

(Hoisting machinery)

L 1365-66 EWT(d)/EWT(m)/EWP(w)/EWP(t)/EWP(k)/EWP(b)/EWP(b)/EWP(l)/EWA(c)
ACCESSION NR: AP5021699 JD/HW UR/0133/65/000/004/0040/0042
621.771.2.004.11

AUTHOR: Markovskiy, I.Z.; Khovrin, B.V.; Demchenko, A.I. 44 55 44 55 44 55 29 B

TITLE: New "300" continuous skelp mill 44 55

SOURCE: Metallurgicheskaya i gornorudnaya promyshlennost', no. 4, 1965, 40-42

TOPIC TAGS: continuous skelp mill, automatic rolling mill, skelp mill, skelp coil, metal strip, bent section, rolled stock/"300" continuous skelp mill

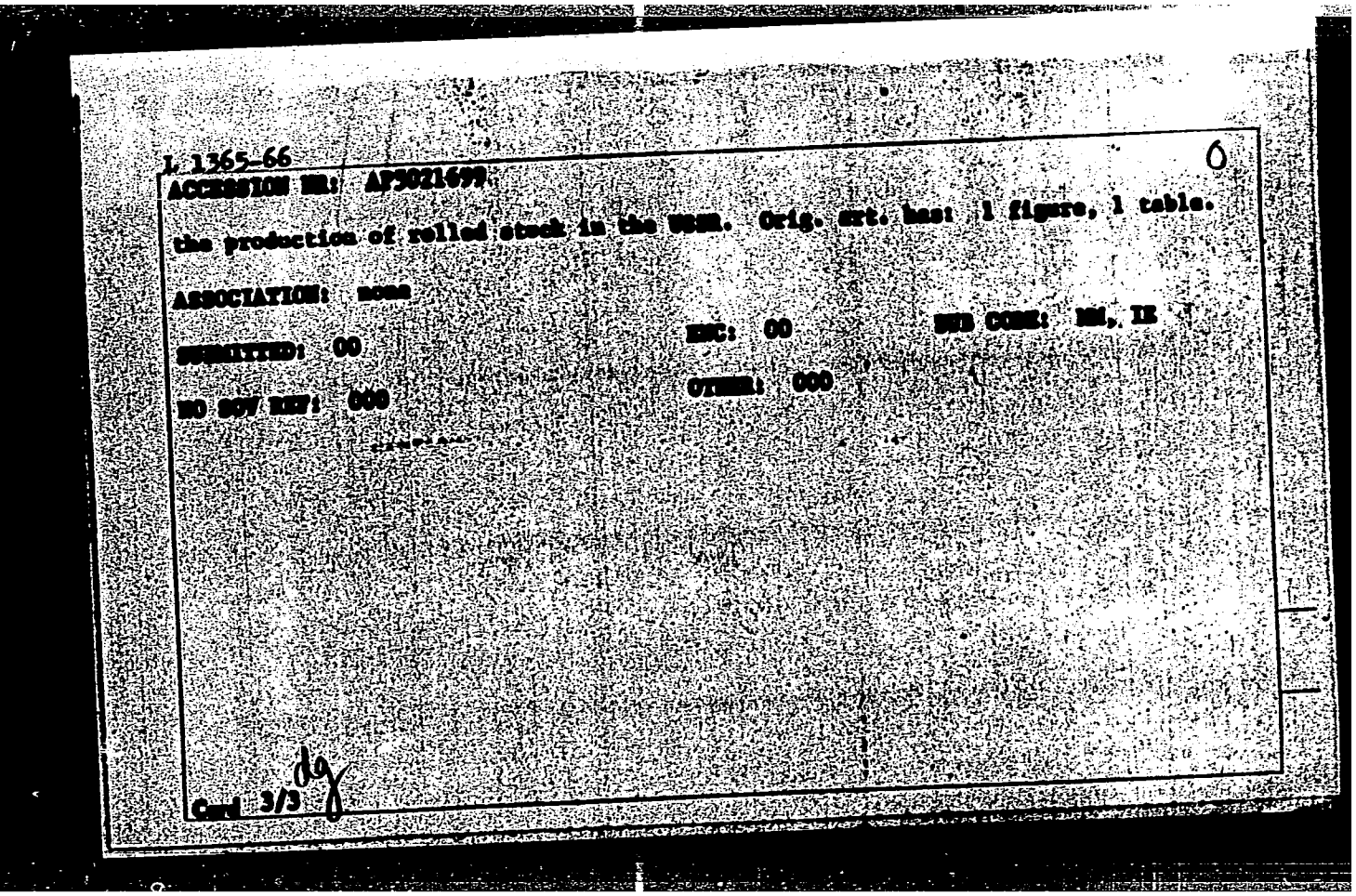
ABSTRACT: This automated "300" continuous skelp mill was installed at the Krivoy Rog Metallurgical Plant imeni Lenin. It is designed to roll skelp 116 to 400 mm wide and 2 to 8 mm thick from billets 100 mm thick, 120-400 mm wide, and 12 m long. The mill consists of 15 roll stands divided into one breakdown group and one finishing group. The breakdown group consists of nine individually driven roll stands with a wide range of rolling speeds; of these nine, three have vertically positioned rolls and six other roll stands in this group are of the horizontal two-high kind. The finishing group consists of six roll stands, also individually driven, of which one is horizontal two-high, three are four-high, and two have vertically positioned rolls. The billets are placed by means of a crane on a manipulator-

Card 1/3

L 1365-66
ACCESSION NR: AP5021699

equipped approach table on which they travel toward a continuous furnace where they are heated to 1200°C; thence they proceed to cutting shears, where they are cut into specific lengths (8 to 12 m), and onto a roller table which carries them to the first roll stand, or discards them if they are defective; the entire process is automated, being controlled by an operator at a control panel. After passing through the breakdown and finishing rolls the skelp is water-cooled on the run-out table and conveyed to two coilers. The rate of travel of the run-out table and the rate of skelp coiling are synchronized with the rolling rate (up to 21 m/sec). The alternate energizing of each coiler is accomplished by the pulse of a photorelay mounted at the end of the run-out table. Each coiler is equipped with a coil removing attachment by means of which the coils are placed on two chain conveyers on which they cool to 250-350°C. At the end of the conveyers are installed coil-removing attachments, two coil-binding machines, and two bundling trolleys. On these trolleys the coils are conveyed to the bays of the warehouse, where they are unloaded by bridge cranes. Since the mill was put into operation (29 May 1964) it has been used to organize the production of such sections as 250x4, 290x4, 320x3.2, 320x3.5, 360x4, and 370x4 mm skelp and strips; and 250, 320, 360, and 370 mm wide, 4.7-8 mm thick sheet bars. It is now being geared to the rolling of 300x4 mm skelp, designed for the production of bent sections; this will be a major contribution to

Card 2/3



L 1365-66 6
ACCESSION NR: AP5021699
the production of rolled stock in the USSR. Orig. art. has: 1 figure, 1 table.
ASSOCIATION: none
SUBMITTED: 00 ENC: 00 SUB CODE: MM, IE
NO REF SOV: 000 OTHER: 000
Card 3/3 dg

MARKOVSKIY, K. G., Eng.

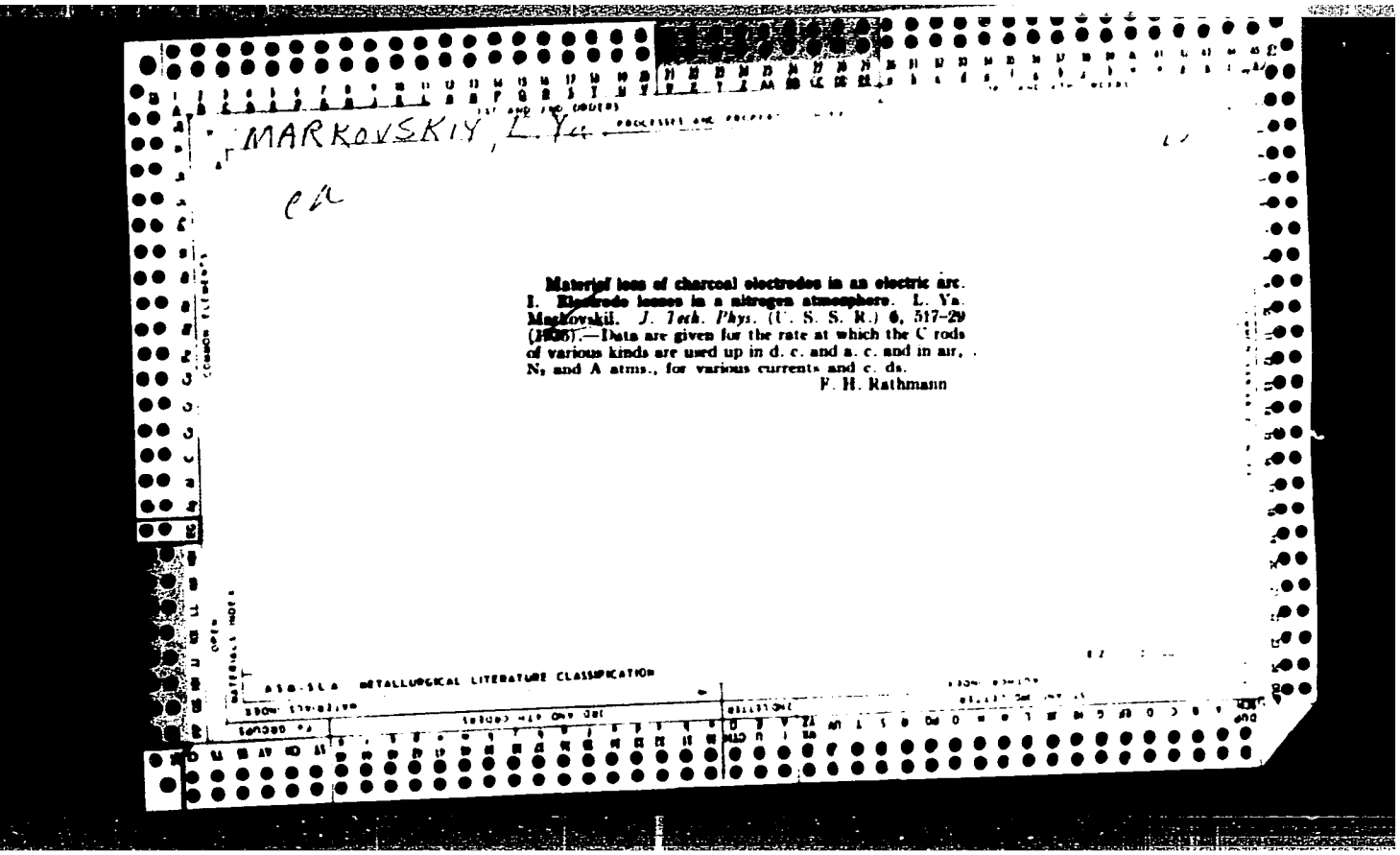
Furnaces

Live blast in burning pulverized anthracite. Elek. sta., 23, No. 5, 1952.

Monthly List of Russian Accessions, Library of Congress, October 1952. UNCLASSIFIED.

MARKOVSKIY, L.S.

Calculating the heat engineering factors of wall thickness. Vod. i san. tekh. no.10:35 O '57. (MIRA 10:11)
(Heating) (Walls)



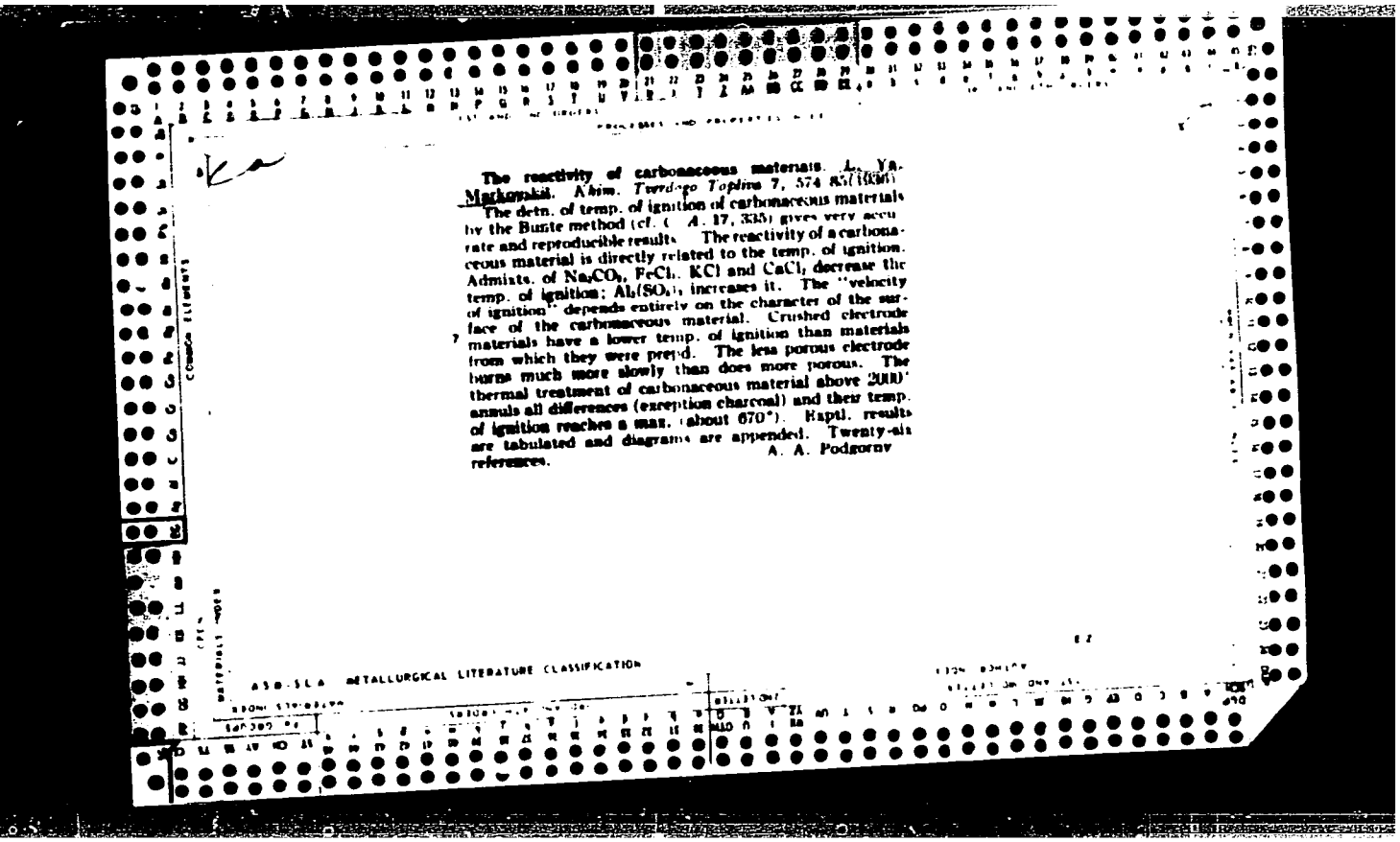
MARKOVSKIY, L. Ya.

ca

Material loss of charcoal electrodes in an electric arc. I. Electrode losses in a nitrogen atmosphere. L. Ya. Markovskii. *J. Tech. Phys.* (U. S. S. R.) **6**, 517–29 (1936).—Data are given for the rate at which the C rods of various kinds are used up in d. c. and a. c. and in air, N_2 and A atms., for various currents and c. ds.

F. H. Rathmann

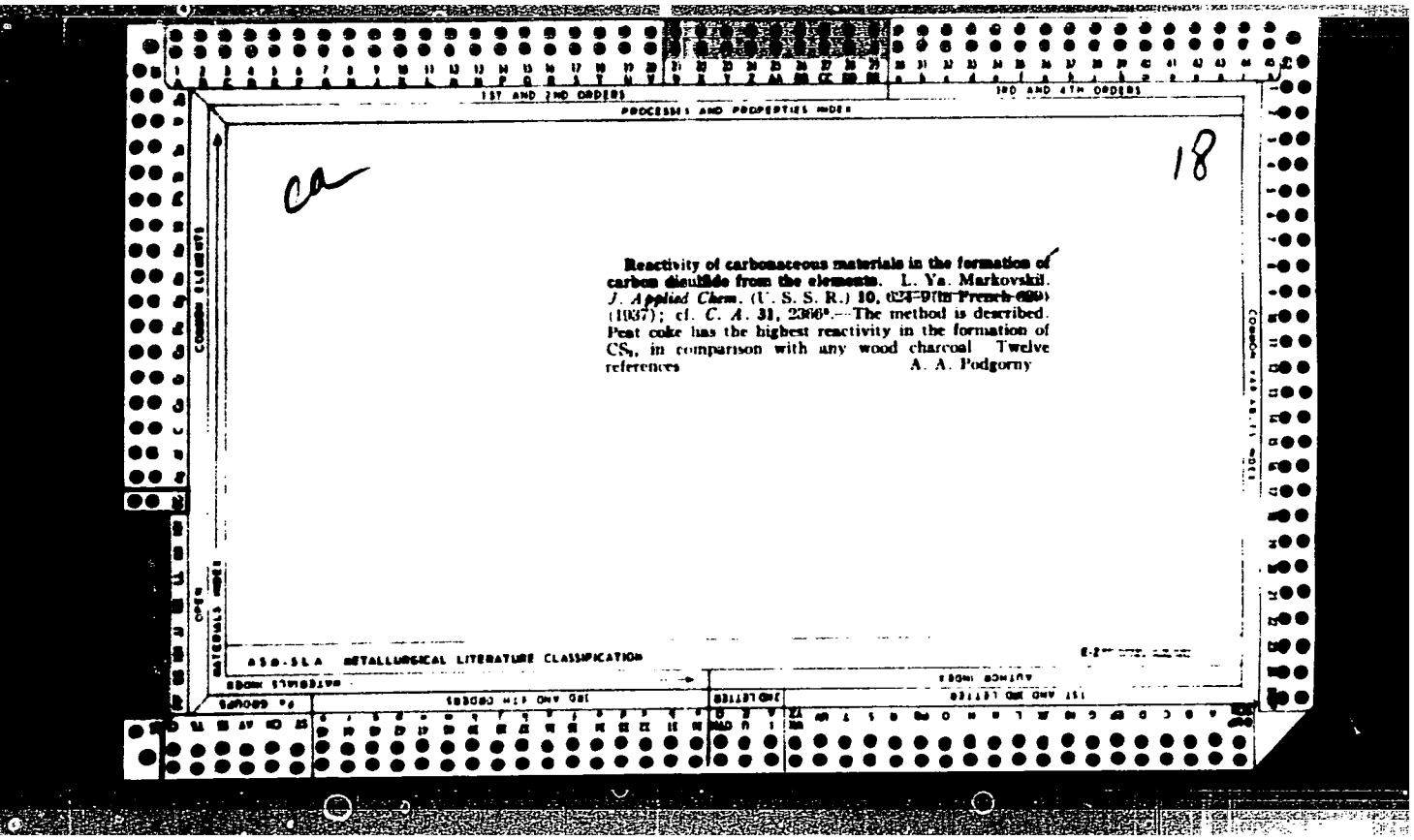
METALLURGICAL LITERATURE CLASSIFICATION



The reactivity of carbonaceous materials. *A.* Ya. Markovskii. *Khim. Tverdogo Topliva* 7, 574 85 (1936)

The detn. of temp. of ignition of carbonaceous materials by the Bunte method (cf. *C. A.* 17, 335) gives very accurate and reproducible results. The reactivity of a carbonaceous material is directly related to the temp. of ignition. Admixts. of Na_2CO_3, $FeCl_3$, KCl and $CaCl_2$ decrease the temp. of ignition; $Al_2(SO_4)_3$ increases it. The "velocity of ignition" depends entirely on the character of the surface of the carbonaceous material. Crushed electrode materials have a lower temp. of ignition than materials from which they were prepd. The less porous electrode burns much more slowly than does more porous. The thermal treatment of carbonaceous material above 2000° annuls all differences (exception charcoal) and their temp. of ignition reaches a max. (about 670°). Exptl. results are tabulated and diagrams are appended. Twenty-six references.

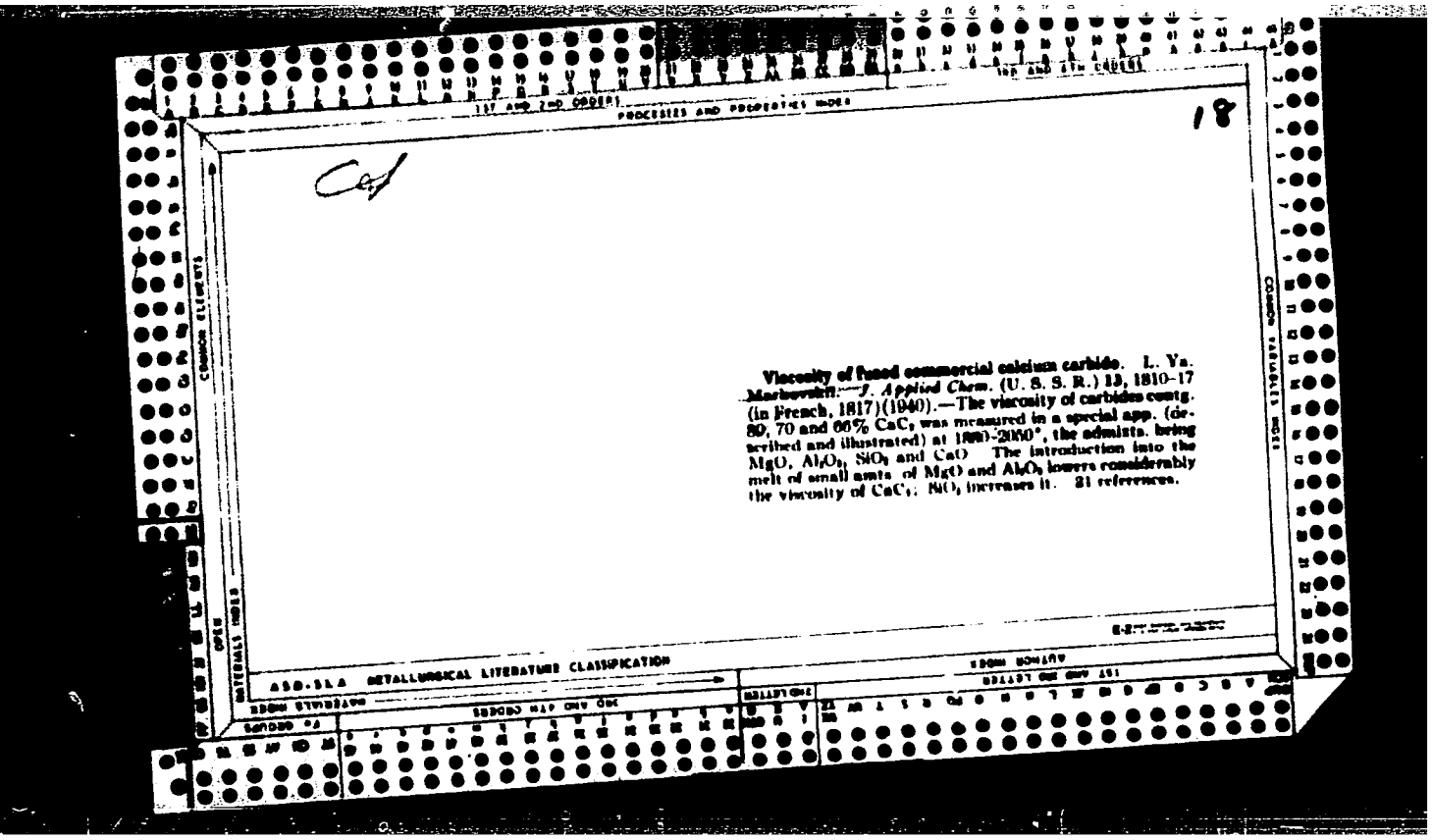
A. A. Podgorny



ca

18

Reactivity of carbonaceous materials in the formation of carbon disulfide from the elements. L. Ya. Markovskii. *J. Applied Chem.* (U. S. S. R.) **10**, 624-9 (in French 629) (1937); cf. *C. A.* **31**, 2366°.—The method is described. Peat coke has the highest reactivity in the formation of CS_2, in comparison with any wood charcoal. Twelve references. A. A. Podgorny

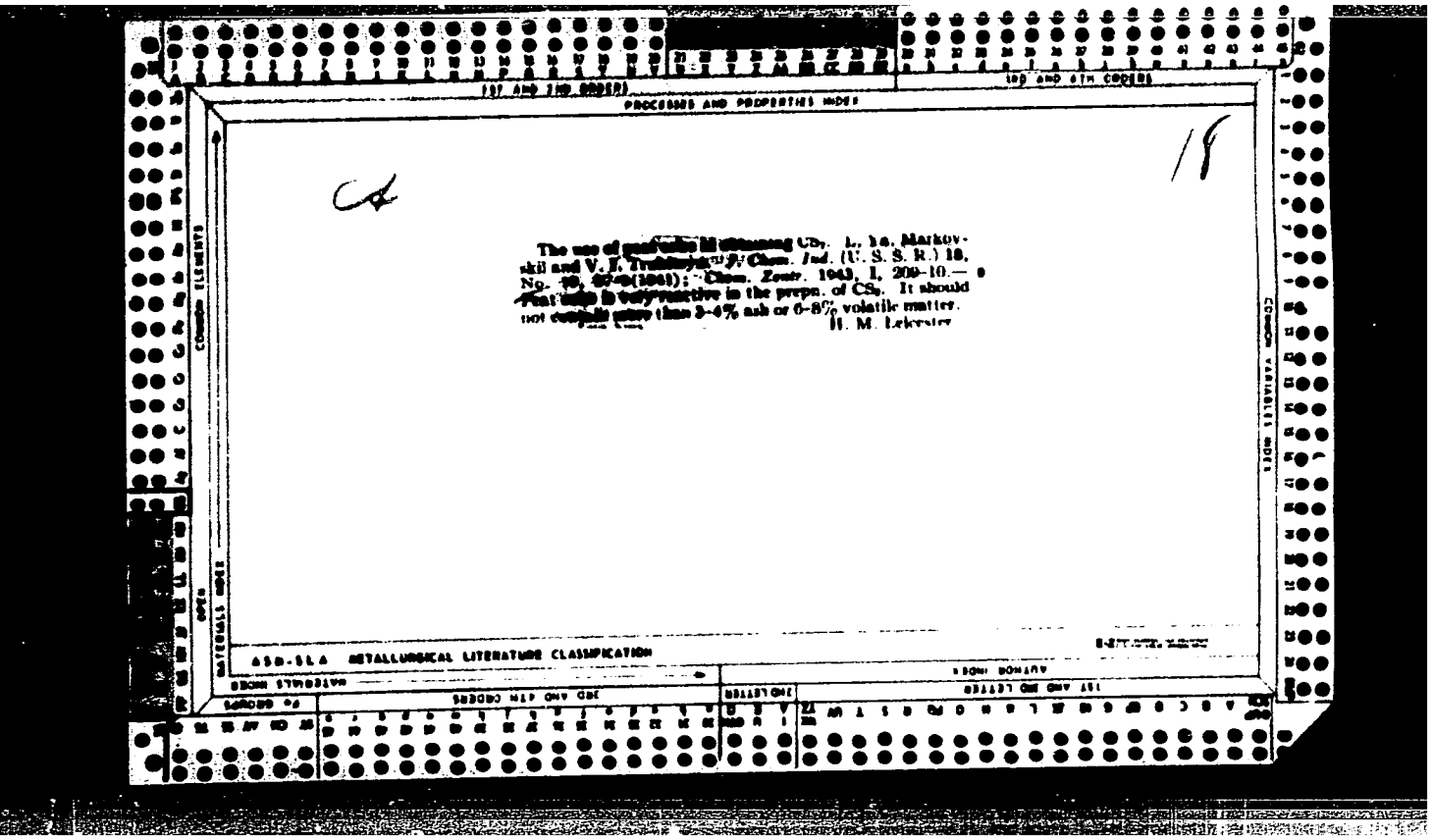


18

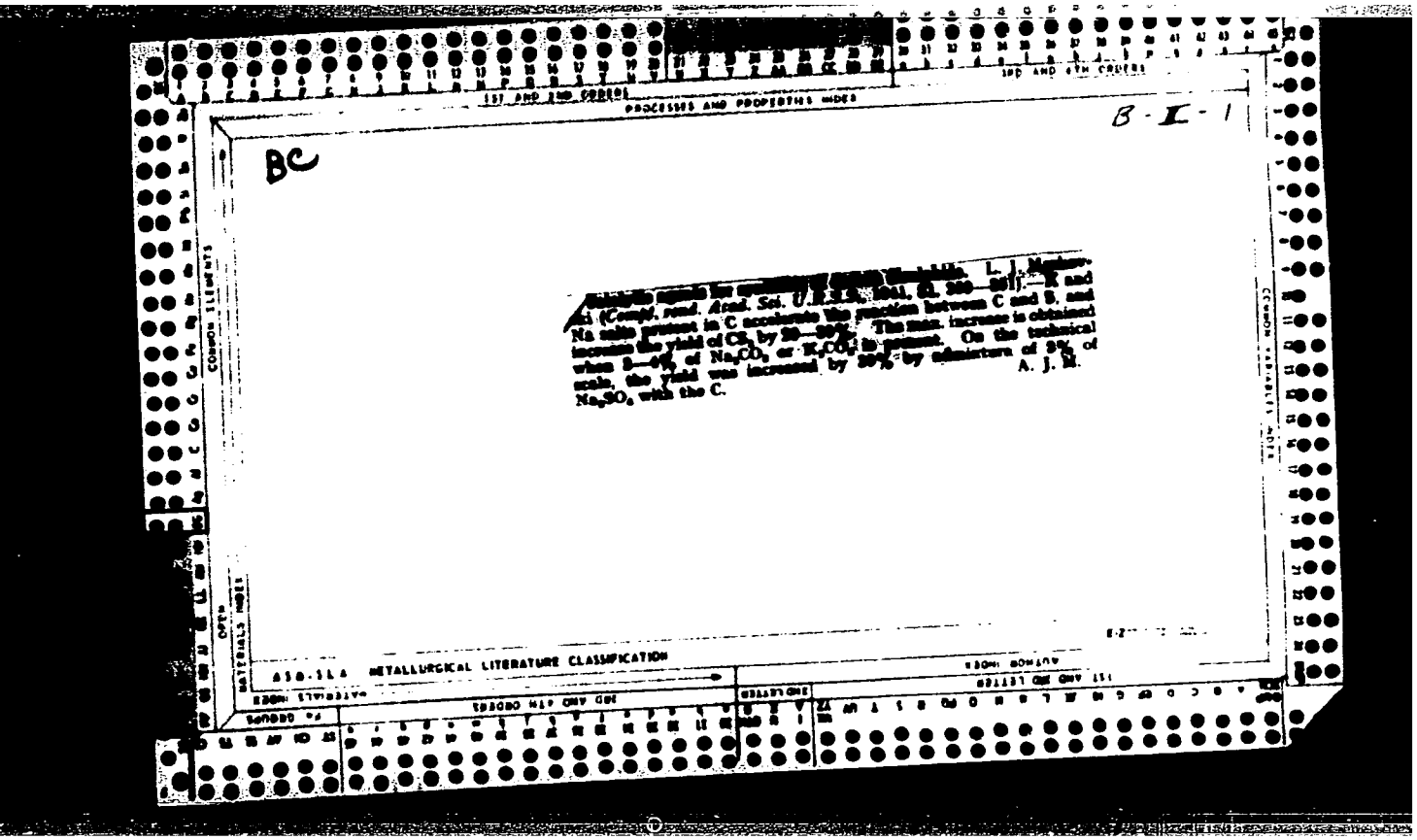
Ca

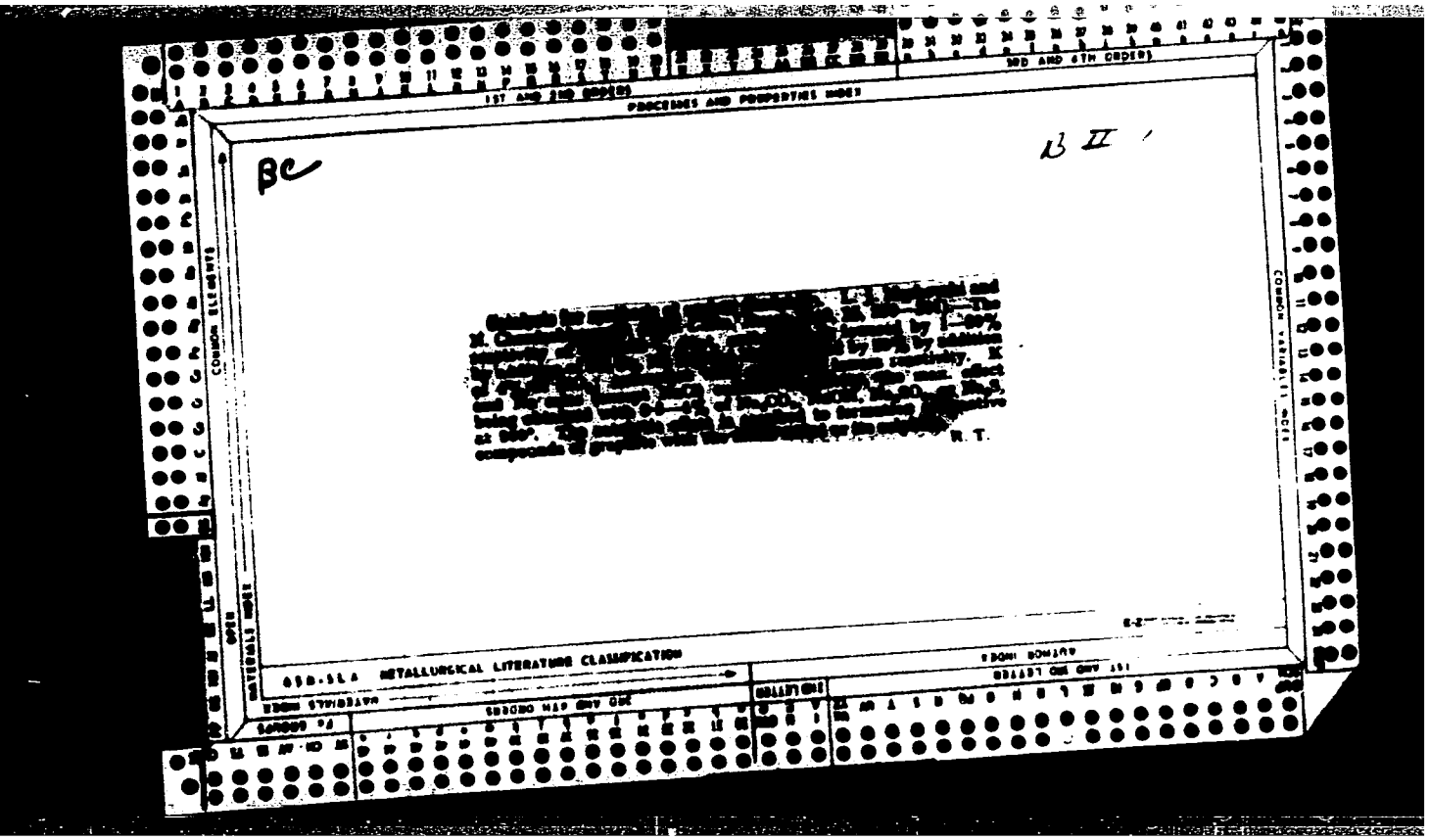
Viscosity of fused commercial calcium carbide. L. Ya. Marbovskii.—*J. Applied Chem.* (U. S. S. R.) 13, 1810–17 (in French, 1817)(1940).—The viscosity of carbides contg. 80, 70 and 66% CaC_2 was measured in a special app. (described and illustrated) at 1800–2050°, the admixts. being MgO, Al_2O_3, SiO_2 and CaO. The introduction into the melt of small amts. of MgO and Al_2O_3 lowers considerably the viscosity of CaC_2; SiO_2 increases it. 21 references.

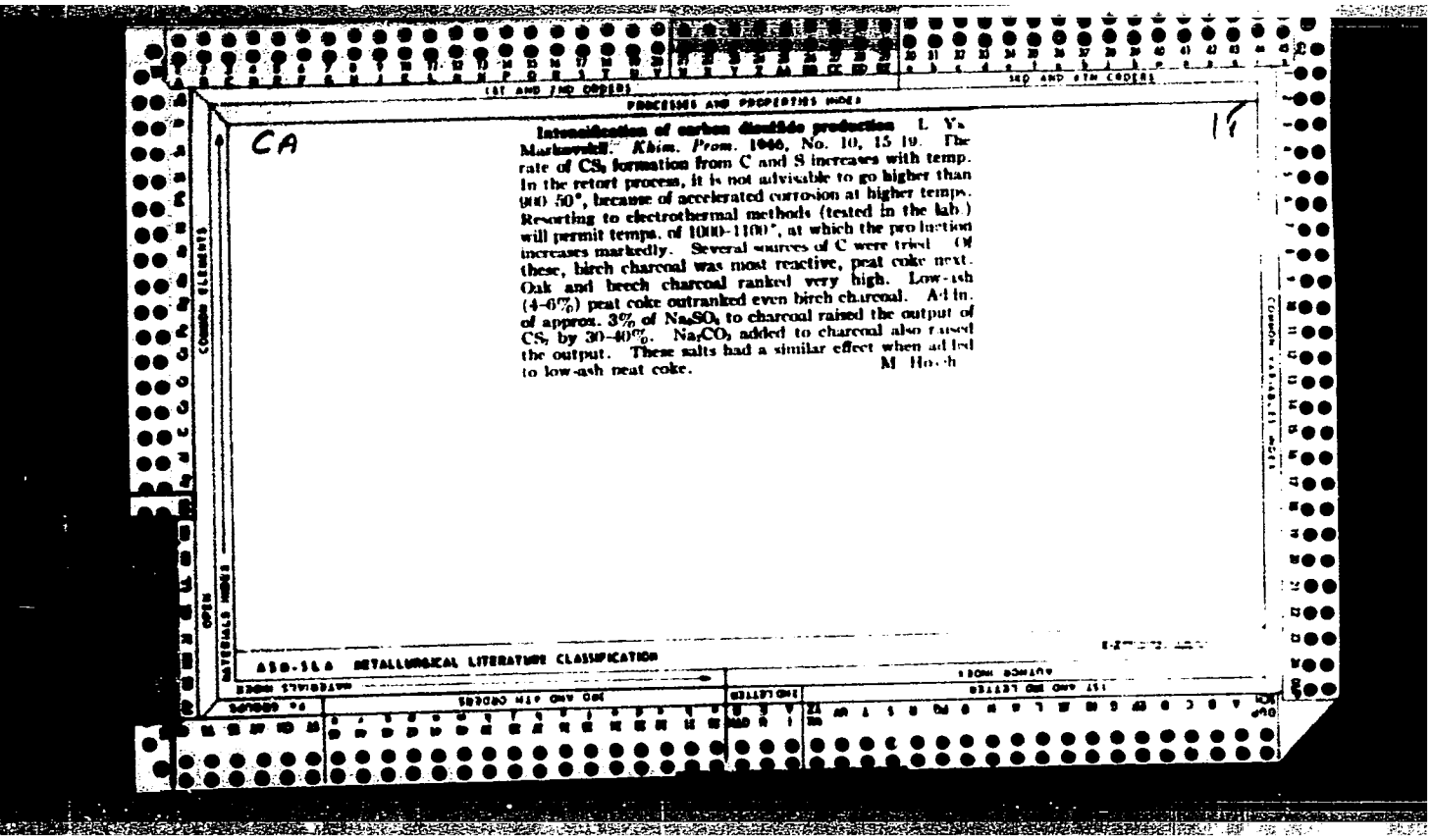
ASD-SLA METALLURGICAL LITERATURE CLASSIFICATION



The use of [illegible] in obtaining CS2. L. Ia. Markovskii and V. I. Trubitsyna. *Zhur. Prikl. Khim. Ind.* (U. S. S. R.) 16, No. 10, 67-9(1943); *Chem. Zentr.* 1943, I, 209-10.— [illegible] Peat tulip is unsatisfactory in the prepn. of CS2. It should not contain more than 3-4% ash or 6-8% volatile matter.
H. M. Leicester







CA

16

Intensification of carbon disulfide production. L. Ya. Markovskii. *Khim. Prom.* 1946, No. 10, 15-19. The rate of CS_2 formation from C and S increases with temp. In the retort process, it is not advisable to go higher than 900-50°, because of accelerated corrosion at higher temps. Resorting to electrothermal methods (tested in the lab.) will permit temps. of 1000-1100°, at which the production increases markedly. Several sources of C were tried. Of these, birch charcoal was most reactive, peat coke next. Oak and beech charcoal ranked very high. Low-ash (4-6%) peat coke outranked even birch charcoal. Addn. of approx. 3% of Na_2SO_4 to charcoal raised the output of CS_2 by 30-40%. Na_2CO_3 added to charcoal also raised the output. These salts had a similar effect when added to low-ash peat coke.

M. Hoch

MARKOVSKIY, L.Ya.

Reactive capacity of carbonaceous substances in carbon bisulfide formation from elements; effect of activating additives. Sbor.rab. Inst.prikl.khim. no.39:124-149'47. (MLRA 7:3)
(Carbon bisulfide) (Carbon, Activated)

MARKOVSKIY, L.Ya.; ORSHANSKIY, D.L.; PRYANISHNIKOV, V.P.; KONDAKOV, V.G., redaktor; KRLIKH, Ye.Ya., tekhnicheskiy redaktor.

[Chemical electrothermics] Khimicheskaia elektrotermiia. Pod obshchei red. D.L.Orshanskogo. Leningrad, Gos.nauchno-tekhn.izd-vo khim. lit-ry, 1952. 407 p. [Microfilm] (MLRA 7:10)
(Electrochemistry, Industrial) (Thermochemistry)

MARKOVSKIY, L. Ya.

USSR

The catalytic action of mineral admixtures in the reaction for the formation of carbon disulfide from the elements. L. Ya. Markovskii, Z. N. Mamr, and S. I. El'kina (State Inst. Appl. Chem., Leningrad). *Doklady Akad. Nauk S.S.S.R.* 90, 1071–4(1953); cf. *C.A.* 47, 831i; 41, 3033a.—The effect of adding mineral admixts. (particularly alk. salts) on the rate of the reaction $C + S_{(gas)} \rightarrow CS_2$ was detd. by the method described earlier. The expts. were made at 800 and 1000° with an addn. rate for the S of 1.14 g./min. and with C of various types. The strong catalytic action of Na_2CO_3 and $AgNO_3$ was verified. The catalytic action of the alk. salts is attributed to their ability to form topochem. compds. with the graphite lattice. J. R. L.

МАРКОВСКИЙ, Л. Я.

Category: USSR C

Abs Jour: RZh-Kh, No 3, 1957, 7747

Author : Markovskiy, L. Ya., Kondrashev, Yu. D., and Kaputovskaya, G. V.
Inst : Not given
Title : On the Composition and Chemical Properties of Magnesium Borides

Orig Pub: Zh. Obshch. Khimii, 1955, Vol 25, No 3, 433-444

Abstract: It has been established by x-ray and chemical analysis that Mg and B begin to react at 720 ± 20°. At temperatures up to 900°, MgB_2 (I) is formed regardless of the Mg/B ratio. At higher temperatures I decomposes, forming one of three other boride compounds, depending on the temperature; the same compounds are also formed in Mg-B mixtures of varying composition at the same temperatures. I is a dark brown powder which is slowly decomposed by water and more vigorously by acids. When I is treated with hot concentrated HCl, boranes are evolved (0.4-1.1% of the total B content) as well as 2.11-2.12 moles H_2 per mole I. The boride I crystallizes in a hexagonal lattice (of the AlB_2 type); the space-group is D^1_{6h}, a 3.005, c 3.519 A.U.

Card : 1/2

Category: USSR

C

Abs Jour: RZh--Kh, No 3, 195[illegible], [illegible]

(accuracy ± 0.001 A.U.), n = 1, (x-ray = 2.43, ρ 2.4[illegible]-2.5[illegible]; the coplanar Mg-Mg distance is 3.0 A. U. and 3.52 (in different layers), the Mg-B distance is 2.50 and the B-B distance is 1.7[illegible] A.U. The boride A (II), ρ 2.4[illegible], exists between 900 and 1150° and its composition approximates the formula MgB_6; a mixture of II and Mg is converted to I at 800°. The boride II is very resistant to acid attack. The boride B (III) is a nearly black powder, ρ 2.47, and is formed at 1100-1200°; above 1200° it decomposes to form the boride C (IV), ρ 2.44[illegible], which decomposes into the elements at 1700°. IV is unusually resistant to acid attack and its composition approximates the formula MgB_{12}. Compounds II, III, and IV yield markedly different powder diffraction patterns which have not been deciphered. The authors suppose that during the reduction of B_2O_3 by Mg the reaction $2B_2O_3 + 6Mg \rightarrow MgB_2 + MgB_{12} + 6MgO + 6B$ occurs after the highly exothermic reaction $B_2O_3 + 4Mg \rightarrow MgB_2 + 3MgO$.

Card : 2/2

MARKOVSKIY, L.Ya.

The composition and the properties of the borides [illegible] L.Ya. Markovskiy, Yu.D. Kondrashev, and G.V. [illegible]ovskaya. Zhur. Obshchei Khim. 25, 1045-52(1955); cf. C.A. 49, 10700c. The study of the Be-B system showed the presence of 3 individual phases (α, β, γ). The phases were identified by chem. and x-ray analysis. The α-phase was identified as Be_2B. The structure of this phase was identified as cubic ($a = 4.081 \pm 0.001$ kX). This compd. hydrolyzed in H_2O to give BH_3 and $Be(OH)_2$ and was completely sol. in dil. HCl. The β and γ phases, which are insol. in acids, were assigned the compn. BeB_6. Their structures were not identified. J. Rovtar Lesch

MARKOVSKIY, L. Ya.

AID P - 2257

Subject : USSR/Chemistry

Card 1/1 Pub. 152 - 2/19

Authors : Markovskiy, L. Ya. and Z. N. Mazur

Title : Reactivity of carbonaceous materials in the formation of carbon disulfide from the elements and the catalytic action of alkali metal salts. Part III.

Periodical: Zhur. prikl. khim., 28, no.2, 123-134, 1955

Abstract : A method is described for determination of the rate of formation of CS_2 by passing sulfur vapor through granulated carbonaceous materials. Formation of CS_2 on charcoal made from sugar or birchwood and on anthracite was investigated. The effects of temperature, grain size of carbon, and addition of alkali metal salts are discussed. Five tables, 7 diagrams, 19 references (9 Russian: 1936-53).

Institution: State Institute of Applied Chemistry. Leningrad

Submitted : Jl 24, 1953

MARKOVSKIY, L. YA.

USSR/Chemistry - Applied chemistry

Card 1/1 Pub. 22 - 17/47

Authors : Markovskiy, L. Ya.; Kondrashev, Yu. D.; and Kaputovskaya, G. V.

Title : Composition and structure of magnesium borides

Periodical : Dok. AN SSSR 100/6, 1095-1098, Feb 21, 1955

Abstract : Data are presented regarding magnesium borides synthesized from elements in an atmosphere of purified electrolytic hydrogen. Magnesium borides appear in the form of a dark-brown powder which decomposes (partially) during continuous heating with HCl. H_2O_2, slowly and gradually oxidizes the powder but to a lesser extent than nitric acid. The physico-chemical properties of magnesium borides and described. Six references: 1 USSR, 1 English, 1 French, 2 USA, and 1 Scandinavian (1906-1952). Tables; diagram.

Institution: Ministry of Chemical Industry SSSR, State Institute of Applied Chem.

Presented by: Academician I. I. Chernyaev, November 25, 1954

MARKOVSKIY, L. YA.

USSR/ Chemistry - Applied chemistry

Card 1/1 Pub. 22 - 25/51

Authors : Markovskiy, L. Ya.; Kondrashev, Yu. D.; and Goryacheva, I. A.

Title : About the composition of beryllium borides

Periodical : Dok. AN SSSR 101/1, 97-98, Mar 1, 1955

Abstract : Preliminary data are presented on the composition of beryllium borides. Samples of Be-borides were synthesized from elements the pulverulent mixtures of which were briquetted at a fixed component ratio and temperature in an H_2 atmosphere. Chemical and x-ray analyses show the presence of at least two phases in the products prepared with a component ratio of Be : B = 2:1; 3:2 and 1:1. The physico-chemical properties of the soluble and insoluble Be-borides are listed. Three references: 1 French, 1 USA and 1 German (1896-1933). Tables; graph.

Institution : Ministry of Chemical Industry USSR, Institute of Applied Chemistry

Presented by : Academician I. I. Chernyaev, November 25, 1954

SAMSONOV, G.V. (Moskva); MARKOVSKIY, L.Ya. (Leningrad)

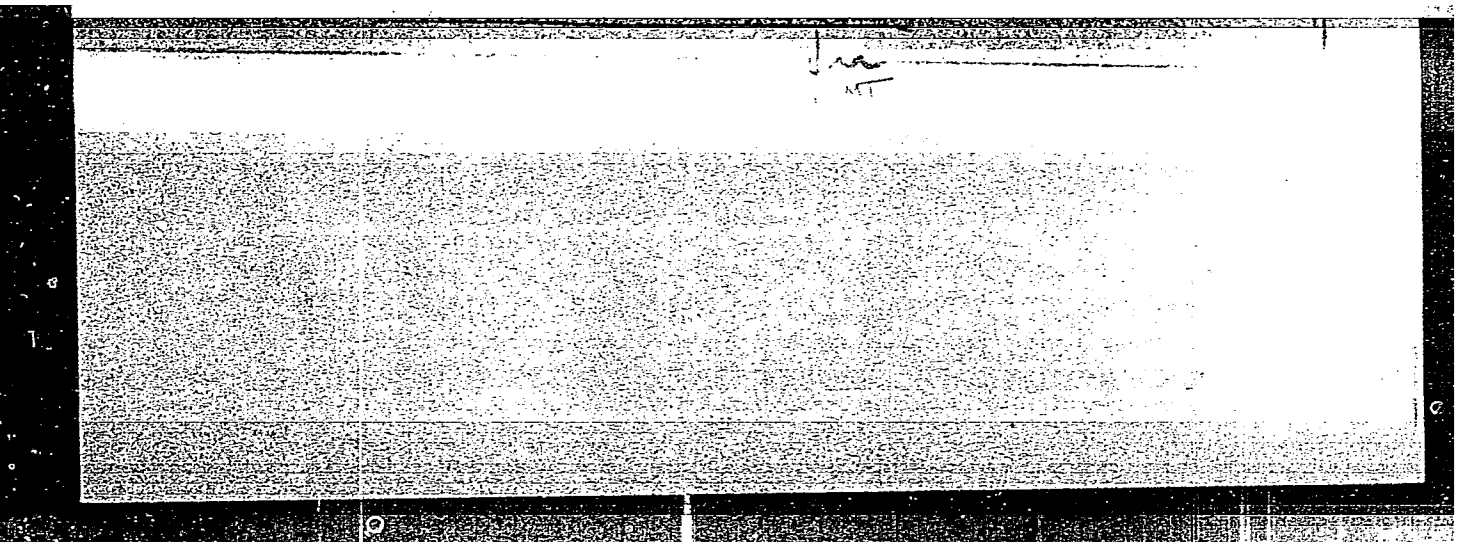
Chemistry of borides. Usp.khim.25 no.2:190-241 F '56. (MLRA 9:6)
(Borides)

MARKOVSKIY, L. Ya.

Compa[illegible] I and II [illegible]

The literature data are given on the [illegible] and the proper-[illegible]

Ag, Au, Zn, and Cd. Further exptl. data are presented on the synthesis of lithium boride from the free elements, from [illegible]



APPROVED FOR RELEASE: 06/14/2000 CIA-RDP86-00513R001032520005-3"

MARKOVSKIY, L.Ya.; SMIRNOVA, R.I.

Chemism of the interaction between zinc sulfide and selenic acid. (MIRA 11:2)
Zhur. neorg. khim. 2 no.12:2752-2757 D '57.
(Zinc sulfide) (Selenic acid)

MARKOVSKIY L. YA.

48-5-23/56

SUBJECT: USSR/Luminescence

AUTHORS: Markovskiy L.Ya., and Shtrikhman R.A.

TITLE: Investigation of Luminescent Properties of Some Boron-Phosphate Compounds (Issledovaniye lyuminestsentnykh svoystv nekotorykh borofosfatnykh soyedineniy)

PERIODICAL: Izvestiya Akademii Nauk SSSR, Seriya Fizicheskaya, 1957, Vol 21, #5, pp 683-685 (USSR)

ABSTRACT: Luminescent properties of boron phosphate and its salts were investigated. The activation of BPO_4 by manganese, titanium, cerium and neodymium did not yield positive results. In the activation by tallium it was found that the optimum concentration of tallium was 3.5 % and optimum calcination temperature was 700°C. Under these conditions a luminophore with maximum emission at 410 mμ was obtained.

A special effect of adding B_2O_3 in changing luminescent properties of phosphates was detected.

It was found that cadmium pyrophosphate activated by manganese and boron can be of practical importance. Another luminophore

Card 1/2

48-5-23/56

TITLE: Investigation of Luminescent Properties of Some Boron-Phosphate Compounds (Issledovaniye lyuminestsentnykh svoystv nekotorykh borofosfatnykh soyedineniy)

of possible importance can be a new phase of cadmium phosphate obtained by sintering initial substances at 750°C. It exceeds industrial trades of phosphates L-34 and L-35 in luminosity and has a more intensive emission in the red region of spectrum.

The report was followed by a discussion.

One Russian reference is cited.

INSTITUTION: State Institute of Applied Chemistry.

PRESENTED BY:

SUBMITTED: No date indicated

AVAILABLE: At the Library of Congress.

Card 2/2

MARKOVSKIY, L. Ya.

5
1-4E2c

"Micromethod for the determination of the fusion temperatures of highly refractory materials." L. Ya. Markovskii, N. V. Velishina, and R. A. Sinitsyna. *Ogneupory* 22, 42-6(1957).—A fragment of the sample, not larger than 2-3 mm. in diam., is fixed on a graphite block heated in a graphite-tube (low-voltage) furnace. The temp. of the sample is measured by an optical micropyrometer (Siemens) by observing the heating process through an opening in the graphite tube. If the sample would react with the graphite support, it can be heated on a thin Mo sheet. The interior of the furnace is constantly passed by a slow current of purified A gas; the rate of heating near the fusion temp. is 50–100°/min. The fusion of the sample is observed by the rounding of the angular fragment to a bead. The app. is checked by the fusion points of Cu, Ni, Pt, SiO_2, Al_2O_3, and ZrO_2. The fusion points of Cr_3C_2 (1850°), Ca boride (2230°), and CrB_2 (2280°) were detd. with an accuracy of ±20°. Kieffer and Schwarzkopf (*Hartstoffe und Hartmetalle*, 1953, 717pp.(*C.A.* 48, 9892e)) gave for CrB_2 1850°. The compn. of the CrB_2 before and after the fusion was, therefore, carefully examd. by analytical controls and x-ray spectrometry; no changes were detected, although the CrB_2 melt, perhaps, dissolves some graphite. The fusion app. described is not suitable for the detn. of the f.p. of Be or of Be borides because they react seriously with graphite.

W. Eitel

State Inst. Applied Chem.,

68925

SOV/81-60-1-644

5.2400(A)

Translation from: Referativnyy zhurnal. Khimiya, 1960, Nr 1, p 91 (USSR)

AUTHORS: Markovskiy, L.Ya., L'vova, V.I., Kondrashev, Yu.D.

TITLE: On the Production of Elemental Boron in an Electric Glow Discharge

PERIODICAL: V sb.: Tr. Konferentsii po khimii bora i yego soyedineniy. Moscow, Goskhimizdat, 1958, pp 36 - 45

ABSTRACT: It is expedient to carry out the process of BCl_3 reduction by hydrogen in an electrical glow discharge at a pressure of 30 - 200 mm Hg. The formation of elemental boron in the highly-dispersed state as well as in the form of a growth on the electrodes depends on the kinetic and electrical conditions of the process. The laboratory production of highly-dispersed boron in the glow discharge with a purity of up to 99.9% with a yield of up to 50% from BCl_3 is possible at a single passing of the gas mixture through the discharge. According to the data of comparative roentgenographic investigations of elemental boron obtained by various methods, electrodischarge boron is the purest and the most typical sample of microcrystalline boron.

Authors' summary

Card 1/1

AUTHORS: Markovskiy, L. Ya., Kap[illegible]ovskaya

TITLE: On the Interaction of Elementary Boron and Some Borides with Potassium Periodate and Potassium Iodate (O vzaimodeystvii elementarnogo bora i nekotorykh boridov s peryodatom i yodatom kaliya)

PERIODICAL: Zhurnal Neorganicheskoy Khimii, 1958, Vol. 3, Nr 2, pp. 328-332 (USSR)

ABSTRACT: Investigations of the oxidation of boron and some borides with potassium periodate and potassium iodate in acid solutions were performed. The signal for the reaction of borides and potassium periodate is the entrance of elementary boron into the reaction. Elementary boron and the borides of magnesium, beryllium, calcium, barium and manganese are dissolved in acid solutions of potassium periodate and potassium iodate. The borides of chromium, titanium, zirconium and aluminum as well as boron carbide and boron nitrite do not decompose in acid solutions with potassium iodide and potassium iodate. This can be analytically used for the separation of the above-mentioned borides of boron. The determination of boron in the initial substances is performed by the alkalismeltings. The

Card 1/2

On the Interaction of Elementary Boron and Some Borides With Potassium Periodate and Potassium Iodate 78-2-12/43

influence of potassium periodate upon amorphous boron shows that the oxidation of boron takes place according to the following reaction: $3\ KJO_4 + 2\ B \longrightarrow 3\ KJO_3 + B_2O_3$. The oxidation of boron with potassium iodate takes place according to the following reaction: $KJO_3 + 2\ B \longrightarrow B_2O_3 + KJ$. The obtained results can be utilized for the conversion of elementary boron and some borides in a solution for analytical purposes as well as for the separation of mixtures of boron and borides which are difficult to dissolve. There are 4 tables and 7 references.

ASSOCIATION: State Institute for Applied Chemistry (Gosudarstvennyy institut prikladnoy khimii)

SUBMITTED: December 30, 1956

AVAILABLE: Library of Congress

Card 2/2

AUTHORS: Markovskiy, L. Ya., Kaputovskaya, G. V. SOV/32-24-9-10/53

TITLE: Periodate and Iodate Methods for the Analysis of Elementary Boron and of Borides (Periodatnyy i iodatnyy metody analiza elementarnogo bora i boridov)

PERIODICAL: Zavodskaya Laboratoriya, 1958, Vol 24, Nr 9, pp 1065-1066 (USSR)

ABSTRACT: The test results obtained in the study of the interaction of elementary boron and of borides with acid solutions of potassium periodate and iodate have facilitated the development of new, accelerated methods using the method of Shtok-Dzhons (Ref 2). For the dissolution of boron or borides, both periodate and iodate can be used. With the latter, the oxidation occurs more slowly. The present method can be employed for the boron determination in elementary boron and in the borides of a number of metals. With regard to speed and selectivity, this method has several advantages over the other methods described in the literature. From the analytical procedure specified it is apparent, amongst others, that the oxidation is effected with a KJO_4 (or KJO_3) solution (acidified with HNO_3 or HCl) and by means of boiling in a reflux condenser. Excessive KJO_4 and KJO_3

Card 1/2

Periodate and Iodate Methods for the Analysis of Elementary Boron and of Borides

are removed with KJ, and the iodine separated out is titrated with a 0,1 n thiosulfate solution. For the KJO_3 content determination, the method of Myuller and Fridberger (Ref 7) can be employed instead of that of Shtok-Dzhons.
There are 2 tables and 7 references, 2 of which are Soviet.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

MARKOVSKIY, L.Ya.; VEKSHINA, N.V.

Production of alkaline earth metal borides by means of carbon reduction of their oxides. Zhur. prikl. khim. 31 no.9:1293-1299 S '58. (MIRA 11:10)

1.Gosudarstvennyy institut prikladnoy khimii.
(Alkaline earth borides)

5 (2)

AUTHORS: Markovskiy, L. Ya., Kaputovskaya, G. V., Kondrashev, Yu. D.

SOV/78-4-8-3/43

TITLE: On the Problem of the Existence of a Magnesium Boride of the Composition Mg_3B_2 (K voprosu o sushchestvovanii borida magniya sostava Mg_3B_2)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1959, Vol 4, Nr 8, pp 1710 - 1714 (USSR)

ABSTRACT: In his classical paper on boron H. Moissan pointed to the fact (Ref 1) that boron forms several compounds with magnesium, among them one with the formula Mg_3B_2. This opinion is maintained also in the papers of other research workers (Refs 2-5). In earlier papers of the authors (Refs 6,7) simultaneously with American scientists (Refs 8,9), however, no such compound Mg_3B_2 was found. Table 1 shows the new experimental results. Figure 1 shows the formation of tetraborane in dependence on the composition of the sinter. The yield in tetraborane increases with the magnesium content of the sinter. By means of infrared spectroscopy it was found that tetraborane is formed

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On the Problem of the Existence of a Magnesium Boride of the Composition Mg_3B_2 SOV/78-4-8-3/43

as final product in the hydrolysis of MgB_2. Table 3 shows the interplanar spacings for the various compounds of magnesium with boron. It may be seen from it that magnesium boride with the formula Mg_3B_2 does not exist. There are 1 figure, 3 tables, and 14 references, 7 of which are Soviet.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: October 11, 1957

Card 2/2

SOV/[illegible]

24(7)

AUTHORS: Vasil'yeva, V. N., Dvorzhetskaya, L. A., Marevskiy, L. Ya., Khlebnikova, L. Ya.

TITLE: The Spectral Analysis of Luminophore-pure Sulfides and Zinc Sulfates With the Application of Chemical Enrichment

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, 1959, Vol 23, Nr 9, pp 1153 - 1154 (USSR)

ABSTRACT: For the production of synthetic luminophores it is necessary to produce pure zinc sulfides. For this purpose a method of analysis was developed, which permits the determination of micro-quantities of Cu, Fe, Ni and Co in these preparations. The method, which was developed at the IREA, is complicated and takes too long. In the case under investigation, the admixtures of Cu, Fe, and Ni and Co must not exceed 5.10^{-5}% and 1.10^{-5}% respectively. As a direct spectral analysis does not have the necessary sensitivity in order to determine the small quantities (with the exception of Cu), chemical enrichment is necessary: 10 g of zinc sulfide is dissolved in HCl and converted to $ZnSO_4$. This solution is then enriched. For the direct analysis of $ZnSO_4$ the same method is used; further

Card 1/2

The Spectral Analysis of Luminophore-pure Sulfides and Zinc Sulfates With the Application of Chemical Enrichment SOV/28-23-9-47/57

ment in the first case is roughly 100-fold and in the second about 50-fold. The spectroscopic analysis was also carried out on weakly acid solutions of zinc chlorides in water with micro-admixtures. A direct current arc was used as a light source. The sensitivities of this determination of Ni, Cu, Fe, and Co from the two solutions are given. The mean arithmetical error is 15% for Co, 25% for Ni, and Fe, and 60% for Cu. There are 1 figure and 8 references, 3 of which are Soviet.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

Card 2/2

MARKOVSKIY, L Ya

PHASE I BOOK EXPLOITATION SOV/5227

Samsonov, Grigoriy Valentinovich [Professor, Doctor of Technical Sciences], Lev Yakovlevich Markovskiy [Candidate of Chemical Sciences], Aleksey Fomich Zhigach [Doctor of Chemical Sciences], and Mikhail Georgiyevich Valyashko [Doctor of Chemical Sciences]

Bor, yego soyedineniya i splavy (Boron, Its Compounds and Alloys) Kiyev, Izd-vo AN UkrSSR, 1960. 589 p. 3,000 copies printed.

Sponsoring Agency: Akademiya nauk Ukrainskoy SSR. Institut metallokeramiki i spetsial'nykh splavov.

Ed. (Title page): G. V. Samsonov, Professor, Doctor of Technical Sciences; Resp. Ed.: I. N. Frantsevich, Corresponding Member of the Academy of Sciences UkrSSR; Ed. of Publishing House: Z. S. Pokrovskaya; Tech. Ed.: V. Ye. Sklyarova.

PURPOSE: This book is intended for scientific workers and engineers in the metallurgical, machine building, chemical, and electronic industries. It may also be used by advanced students.

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SOV/5227

Boron, Its Compounds and Alloys

COVERAGE: The book describes the principles of boron geochemistry, boron stock and its processing, and the properties, production, and use of elementary boron, boron hydrides, and halogens. It also includes data on the properties, production methods, metal science, and crystal chemistry of boron alloys with metals and nonmetals. All known systems with boron are investigated and applications of boron alloys in the manufacture of fireproof alloys, in electronics and radio engineering, machine building, metallurgy, and chemistry are discussed. Corresponding Member A. V. Nikolayev, G. V. Samsonov, and Ya. S. Umanskiy are cited among the contributors to boron research in the Soviet Union. The authors thank the Scientific Council of the Institut metallokeramiki i spetsial'nykh splavov (Institute of Metal Ceramics and Special Alloys), Academy of Sciences, Ukrainskaya SSR. They also thank Professor Yu. V. Morachevskiy. Most of the chapters are accompanied by references.

TABLE OF CONTENTS:

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A005/A105

24 3500 1160 1155 1138

Translation from: Referativnyy zhurnal, Khimiya, 1961, No. 2, p. 320, # 2K101

AUTHORS: Markovskiy, L.Ya., Sapozhnikov, Yu.P.

TITLE: The Development of Cathode Phosphors on the Basis of Certain Metal Oxides

PERIODICAL: "Sb.tr.Gos. in-ta prikl. khimii", 1960, No. 43, pp. 92 - 100

TEXT: The expediency of the application of mineralizers to the synthesis of the luminescence composition MgO:Cr.LiCl is shown. It is found out that the composition MgO:Cr:LiCl has relatively low emission intensity in the visible spectrum range and is of importance only as an i.r.-emitter. The luminescence composition Al_2O_3:Cr has high emission intensity in the visible spectrum range (λ max 690 mμ) and does not yield to the luminescence composition $Zn_3(PO_4)_2$:Mn with respect to the magnitude of the relative emission brightness. It is shown that it is possible to obtain new luminescence compositions with a wide emission band, a large part of which lies in the red spectrum region by mixing oxides of Zn and Mg. There are 13 references.

Translator's note: This is the full translation of the original Russian abstract.

R.A.

Card 1/1

MARKOVSKIY, L.Ya.; SAPOZHNIKOV, Yu.P.

Different forms and some properties of neutral zinc selenite. Zhur. strukt. khim. 1 no.3:346-352 S-O '60. (MIRA 14:1)

1. Gosudarstvennyy institut prikladnoy khimii.
(Zinc selenite)

MARKOVSKIY, L. YA

5.2400A
15.2220

S/078/60/005/008/005/018
B004/B052 82325

AUTHORS: Markevich, G. S., Kondrashev, Yu. D., Markovskiy, L. Ya.

TITLE: A New Boride Phase in the System Beryllium - Boron

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 8, pp. 1783-1787

TEXT: In 1955 the authors published data on the phase composition of beryllium borides (Refs. 1, 2). Besides the cubic α-phase (Be_2B), β-phase BeB_2, and γ-phase BeB_6, they had also determined a new δ-phase richer in Be which develops at 1000°C during the sintering of a mixture of pulverized boron and pulverized beryllium containing more than 70 atom% of Be. The present paper reports on the investigation of composition and properties of this δ-phase. Mixtures of B- and Be powder were produced in the following ratios: Be : B ranging from 9 : 1 to 2 : 1, and they were radiographically examined (Table 1). Single crystals of the δ phase (Fig.) were obtained after 100 h of continuous heating in evacuated quartz ampuls. Data of the radiographic investigation of these crystals are given

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A New Boride Phase in the System Beryllium - Boron

S/078/60/005/008/005/018
B004/B052 82325

in Table 2. The new boride corresponds to the formula Be_5B, and its crystals are tetragons with the lattice constants $a = 3.362 \pm 0.002$ kX, $c = 7.036 \pm 0.005$ kX, $c/a = 2.093$. The specific gravity d_{20}^4, pycnometrically determined, is 2.06 - 2.14 g/cm^3. The specific electric resistance does not differ from that of the α-phase. The hydrolytic decomposition of Be_5B into 8 N of HCl was investigated, and the liberated hydrogen, the developing boranes, and the dissolving boron suboxides BO were determined (Tables 3, 4). On the basis of these data, the following reaction equations are given:

$$Be_5B + 10H_2O \longrightarrow BH_3 + 5Be(OH)_2 + 3.5H_2 \quad (1)$$

$$BH_3 + H_2O \longrightarrow BO + 2.5\ H_2 \quad (2)$$

$$Be_5B + 11H_2O \longrightarrow BO + 5Be(OH)_2 + 6H_2 \ .$$

It is assumed that primary BH_3 develops, and the formation of di- and

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A New Boride Phase in the System Beryllium - Boron

S/078/60/005/008/005/018
B004/B052 82325

tetraboranes is only caused by the polymerization of BH_3. Since the reaction between BH_3 and water is intensive, no more than 8% of borane develop, calculated with respect to the total amount of boron. Be_5B still is the boride yielding the maximum amounts of borane, since Be_2B only develops 2% of boranes. There are 4 figures, 1 table, and 6 Soviet references.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: May 4, 1959

Card 3/3

MARKOVSKIY, L.Ya.; SMIRNOVA, R.I.

Reactions taking place between dry powders of ZnS and SeO_2. Zhur. neorg.khim. 5 no.9:2042-2047 S '60. (MIRA 13:11)

1. Gosudarstvennyy institut prikladnoy khimii.
(Zinc sulfide) (Selenium oxide)

8[illegible]

S/078/60/005/012/003/016
B017/B064

5.2200 2209, 1273, 1043

AUTHORS: Markovskiy, L. Yu., Sapozhnikov, Yu. P.

TITLE: Some Properties of Lead Selenite

PERIODICAL: Zhurnal neorganicheskoy khimii, 1960, Vol. 5, No. 12, pp. 2655-2661

TEXT: Lead selenites were prepared by the following methods:
a) Reaction of lead nitrate or lead acetate with potassium selenite in the stoichiometric ratio.
b) reaction of lead acetate with a solution of selenious acid,
c) reaction of lead nitrate with an excess of selenious acid,
d) reaction of lead carbonate with selenious acid.
Acid lead selenite $Pb(HSeO_3)_2$ was formed by the methods b), c), and d). Lead biselenite $PbSe_2O_5$ was prepared by heating $Pb(HSeO_3)_2$ to 130°C. The best method of synthesizing lead selenite is that of precipitating from a solution of lead acetate with selenious acid or potassium selenite. After the synthesis, the following compounds were separated: $PbSeO_3$,

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Some Properties of Lead Selenite

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B017/B064

$Pb(HSeO_3)_2$, and $PbSe_2O_5$. Moreover, the double salt $PbSeO_3 \cdot Pb(NO_3)_2$ was separated, and its occurrence confirmed by chemical and X-ray phase analyses. The lattice parameters of the compounds are given. Microphotographs were taken of the individual forms of lead selenites. The thermal stability of lead selenites was studied. The differential-thermal curves were determined with an ДПТ-09 (DPT-09) recording electronic potentiometer, and with an ФПК-54 (FPK-54) Kurnakov pyrometer. The thermograms of $PbSeO_3$ show two endothermic effects: the melting point lies at $675 \pm 10^{\circ}C$, and SeO_2 forms at 790-830°C. At 410°C, a strong endothermic effect appears on the thermograms of the double salt, indicating the decomposition of this compound. When further heated, the reaction product melts, and at 690-700°C SeO_2 vapors form in a considerable amount. An endothermic effect appears at 110-120°C on the $Pb(HSeO_3)_2$ thermogram corresponding to the dehydration of this compound. On further heating of the dehydrated product, SeO_2 vapor is generated at 380°C. There are 6 figures, 3 tables, and 17 references: 9 Soviet.

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85622

Some Properties of Lead Selenite

S/078/60/005/012/003/016
B017/B064

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: August 11, 1953

Card 3/3

MARKOVSKIY, L YA.

81918

S/051/60/009/01/013/031
E201/E691

24.3500

AUTHORS: Markovskiy, L.Ya. and Orshanskaya, N.S.

TITLE: Properties of Luminescence of Zinc Oxide Activated with Selenium

PERIODICAL: Optika i spektroskopiya, 1960, Vol 9, Nr 1, pp 77-82 (USSR)

ABSTRACT: The authors report an investigation of photoluminescence (excitation with 365 mμ light) and cathodoluminescence (V = 9 kV, I = 1 μA/cm^2) of zinc oxide activated with selenium. Zinc oxide was prepared by burning pure zinc sulphide in air. Selenium was introduced as a pure solution of selenious acid, or as elemental selenium or pure zinc selenide. The spectra were obtained by means of apparatus consisting of a universal monochromator UM-2, a photomultiplier FEU-17 and a mirror galvanometer GZS-47. The duration of afterglow was measured oscillographically (Ref 16). It was found that introduction of selenium into ZnO produces a characteristic cathodoluminescence band at 610 mμ. This band was strongest in ZnO containing 0.2% Se, which exhibited also a band due to excess zinc (~505 mμ). Duration of afterglow of the selenium band was about ten times greater than that of the excess-zinc band. ZnO phosphors containing 0.3-0.4% Se did not have an excess-zinc band

Card 1/2

Properties of Luminescence of Zinc Oxide Activated with Selenium

and their cathodoluminescence intensity amounted to 30% of the similar intensity of ZnO:Zn. Further increase of the amount of Se in ZnO produced concentration quenching of the selenium band. ZnO:Se phosphors were found to be very sensitive to Cu, Fe and Ni impurities: Cu increased the duration of afterglow, while Fe and Ni reduced this duration considerably (Table 4). Acknowledgments are made to F.M. Pekerman for his advice and O.N. Karankin for measurements of afterglow. There are 2 figures, 4 tables and 16 references, 7 of which are Soviet, 4 English, 4 German and 1 Dutch.

SUBMITTED: November 16, 1959

5.2100,5.2200,5.2600

78210
SOV/80-33-3-11/47

AUTHORS: Markovskiy, L. Ya., Kapustovskaya, G. V.

TITLE: Concerning Chemical Stability and Hydrolytic Decomposition of Diborides of Some Transition Metals in Reaction With Acids

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, Nr 3, pp 569-577 (USSR)

ABSTRACT: Borides of Zr, Ti, and Cr in powder form and sintered at 1,800° C under 10 atm in graphite molds were investigated with respect to their chemical stability in concentrated and aqueous sulfuric, nitric, hydrofluoric, and hydrochloric acid. Sintered TiB_2 and $MoSi_2$ were highly stable in HCl (d. 1.19) and H_2SO_4 (d. 1.84) at room temperature, and can be recommended as acid-resistant materials. Addition of metallic Si to TiB_2 and ZrB_2 lowered the chemical stability of

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Concerning Chemical Stability and Hydrolytic Decomposition of Diborides of Some Transition Metals in Reaction With Acids

78210
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the borides in HCl, H_2SO_4, and HNO_3. The diborides evolved boron hydrides (di- and tetraborane) and hydrogen on decomposition with HCl. ZrB_2 in HCl gave a solution of $ZrOCl_2$; TiB_2 and CrB_2 gave, respectively, $TiCl_3$ and $CrCl_3$ solutions. The rate of dissolution was highest in CrB_2 and lowest in $TiBr_2$. The rate of dissolution depended also on the method of preparation of the diborides; ZrB_2 obtained by the electrolytic method was more stable than that prepared by the reduction of metal oxide with boron carbide under vacuum. The hydrolysis of tetravalent borides of metals, assuming that it proceeds to boric acid, can be expressed by (1) $MeB_2 + 7H_2O \rightarrow Me(OH)_2 + + B_2O_3 + 5H_2$; that of tervalent borides of metals (2) $MeB_2 + 6H_2O \rightarrow Me(OH)_3 + B_2O_3 + 4.5H_2$; that of

Card 2/4

Concerning Chemical Stability and Hydrolytic Decomposition of Diborides of Some Transition Metals in Reaction With Acids

78210
SOV/80-33-3-11/41

bivalent borides of metals (3) $MeB_2 + 5H_2O \rightarrow Me(OH)$ +
+ $B_2O_3 + 4H_2O$. If boron suboxides (e.g., B_2O) are partially formed during the hydrolysis, then the amount of hydrogen evolved must decrease correspondingly, and reaction (1) is replaced by (4) $MeB_2 + 6H_2O \rightarrow Me(OH)_2$ +
+ 2BO + $4H_2$; and reaction (3) by (5) $MeB_2 + 5H_2O \rightarrow Me(OH)_2$ +
2BO + $3.5H_2$. From the amount of hydrogen evolved and the valence of salts formed on hydrolysis, it can be assumed that ZrB_2 hydrolyzes according to reaction (4), and CrB_2, according to reaction (5). The amount of hydrogen evolved in the hydrolysis of TiB is considerably lower than in any of the above reactions, although the reason for this fact is not clear as yet. There are 5 tables; and 31 references, 11 U.S., 1 U.K., 4 French, 3 German, and 14 Soviet. The 5 most recent U.S. and U.K. references are: J. Campbell, High-Temperature Technology,

Card 3/4

Concerning Chemical Stability and Hydrolytic Decomposition of Diborides of Some Transition Metals in Reaction With Acids

78210
SOV/[illegible]

N. Y. (1957); B. Post, F. Glaser, D. Moskowitz, Acta Metal., 2, 20 (1954); L. Richardson, J. Electrochem. Soc., 101, 2220 (1954); J. Stavrolakis, H. Barr, E. Rice, Am. Cer. Soc. Bull., 35, 47 (1956); H. Blumenthal, Powd. Met. Bull., 6, 48, 80 (1951).

SUBMITTED: July 14, 1959

Card 4/4

30605
S/080/60/033/005/002/008

5.2100 CT

AUTHORS: Markevich, G.S., Markovskiy, L.Ya.

TITLE: On the Chemical Resistance of Beryllium Borides in Relation to Oxygen, Nitrogen, and Carbon at High Temperatures

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol 33, No 5, pp 1008 - 1012

TEXT: The following beryllium borides are described in [Refs 1 - 4]: Be_5B, Be_2B, BeB_2, BeB_4, BeB_6 and BeB_9. Their chemical resistance against oxygen, nitrogen, and carbon is investigated here. The samples were placed on BeO plates and heated in a Silit furnace at 1,000 and 1,200°C with free access of air. Borides which are rich in beryllium (Be_5B, Be_2B) are the least resistant against scale formation; borides rich in boron (BeB_2, BeB_4, BeB_6) are the most resistant. The structure of the phases which are rich in boron is not yet deciphered, but it can be assumed that complex three-dimensional boron skeletons are present in them, like those in hexaborides of the MeB_6 type. These boron skeletons apparently cause the high chemical resistance of beryllium borides with high boron content. The beryllium borides with the highest chemical resistance, however, are inferior in this

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80615
S/080/60/033/005/002/008

On the Chemical Resistance of Beryllium Borides in Relation to Oxygen, Nitrogen and Carbon at High Temperatures

respect to the borides of other metals. The Be borides were also treated with nitrogen containing less than 0.01% O_2. A complete analogy with the action of oxygen can be observed, i.e., the chemical resistance of Be borides increases with the boron content in them. During nitration beryllium nitride is formed. At temperatures of up to 1,200°C boron nitride could not be discovered by roentgenographic analysis. For studying the interaction of beryllium borides with carbon, boride powders were mixed with 25 weight % of carbon and heated in briquetted form in an argon atmosphere. At temperatures of 900 - 1,300°C Be_2C is formed which proves that the affinity of beryllium to carbon is greater than to boron.
There are: 4 graphs, 2 tables and 7 references; 6 Soviet and 1 English.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: October 12, 1959

Card 2/2

82671
S/080/60/033/007/018/020
A003/A001

5.2100

AUTHORS: Markovskiy, L. Ya., Markevich, G. S.

TITLE: The Determination of the Softening Temperatures in the Beryllium-Boron System in the Region Rich in Beryllium

PERIODICAL: Zhurnal prikladnoy khimii, 1960, Vol. 33, No. 7, pp. 1667-1669

TEXT: The diagram of fusibility of a beryllium-boron system in the region rich in beryllium (up to 50 atomic % B) was studied. The experiments were carried out on preparations obtained by sintering powders of boron and beryllium. The borides were synthesized from pure B and Be containing 99.4% B and 99.8% Be, respectively. The samples with a cross section of 2 x 2 mm and 10-15 mm long were heated by electric current. The measurements were carried out in a flow of chemically pure argon with a МОП-48 (МОР-48) microoptical pyrometer. The softening temperature was determined for all compositions starting from pure beryllium to a compound with 50 atomic % B. To the composition BeB_2 (66.6% atomic % B) this method is not applicable due to semiconductor properties of this compound. Samples with the composition BeB_6 have such a high electric resistance that they cannot be heated by current to the temperature required.

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S/080/60/033/007/018/020
A003/A001

The Determination of the Softening Temperature in the Beryllium-Boron System in the Region Rich in Beryllium

The curve obtained has extrema for the compositions Be_5B and Be_2B. The data show that the melting point of borides is 70-80°C above their softening temperature. The comparison of the softening temperature with the data obtained by metallographic investigation shows that the eutectics corresponds to the minimum of the curve (~ 11 atomic % B), and the individual chemical compounds to the maxima (16.5 atomic % B and 33.0 atomic % B). The eutectics which consists, according to roentgenographic data, of beryllium metal and the δ-phase, is a mixture of blue-silvery grains of beryllium and rose-colored grains of the δ-phase. There is 1 graph and 8 references: 7 Soviet and 1 German.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: December 21, 1959

Card 2/2

S/078/61/006/004/015/018
B107/B218

51.2200 1160 1155 1043

AUTHORS: Markovskiy, L. Ya., Smirnova, R. I.

TITLE: Chemism of the reaction of cadmium sulfide with selenious acid

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 4, 1961, 948-956

TEXT: The authors studied the formation of cadmium selenite by reaction of cadmium sulfide with selenious acid in aqueous solution, and the formation of cadmium selenide by reaction of cadmium selenite and cadmium sulfide at temperature of about 500 to 900°C. The above synthesis of cadmium selenide is of practical importance for the manufacture of zinc-cadmium-selenide luminophores. The initial substances were cadmium sulfide of a purity required for luminophores, produced by the Leningradskiy zavod "Krasnyy khimik" (Leningrad Plant "Red Chemist"), and selenious acid obtained from twice-sublimated anhydride. The reaction between cadmium sulfide and selenious acid proceeds smoothly at 70°C. The authors studied the reaction at different proportions of the initial substances. With an excess of selenious acid and at a temperature of 50 to 60°C, white crystals of an acid cadmium selenite of the composition 3 $CdSO_3 \cdot H_2SeO_3$ were obtained. The

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B107/B218

Chemism of the reaction of...

best yield in cadmium selenite is obtained at a molar ratio of 2:3. The reaction is assumed to proceed as follows:

$$CdS + H_2SeO_3 = CdSeO_3 + H_2S$$

$$CdSeO_3 + H_2SeO_3 = CdSeO_3 \cdot H_2SeO_3$$

$$CdSeO_3 \cdot H_2SeO_3 + CdS = 2\,CdSeO_3 + H_2S$$

$$2\,H_2S + H_2SeO_3 = 2\,S + Se + 3\,H_2O$$

$$2\,CdS + 3\,H_2SeO_3 = 2\,CdSeO_3 + 2\,S + Se + 3\,H_2O$$

Besides, small quantities (2 to 5 %) of $CdSO_4$ are formed. If the products of the reaction of cadmium sulfide with selenious acid are heated at 500 to 900°C, mainly cadmium selenite is reduced by the elementary sulfur, and with an excess of cadmium sulfide, the latter reacts with cadmium selenite. The purest yield of cadmium selenide is obtained by rapid heating of the initial composition $CdS : H_2SeO_3 = 1 : 1$. The ideal formation of cadmium selenide would proceed as follows:

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Chemism of the reaction of...

$$4/3\ CdSeO_3 + 2/3\ S = 4/9\ CdSe + 2/3\ SO_2$$
$$2/9\ CdS + 2/9\ CdSeO_3 = 2/9\ CdSe + 2/9\ SO_2 + 2/9\ CdO$$
$$2/9\ CdO + 1/9\ CdS + 3/9\ Se = 3/9\ CdSe + 1/9\ SO_2$$

$$CdS + H_2SeO_3 = 2/3\ CdSeO_3 + 2/3\ S + 1/3\ Se + 1/3\ CdS + H_2O = CdSe + SO_2 + H_2O$$

Also in this case, the product obtained contains considerable quantities of oxidic cadmium compounds which are due to the oxidizing action of cadmium selenite. The authors thank Yu. D. Kondrashev for his help. There are 4 figures, 8 tables, and 16 references: 9 Soviet-bloc. The three references to English-language publications read as follows: R. E. Shrader, S. Lasof, H. Leverenz. Preparation and Characteristics of Solid Luminescent Materials, Symposium, Oct. 1946, New York, 1948, p. 238; P. Brown, J. Electronics, 2, 154 (1956); G. Crosby, US Patent 2818301, December 31, 1957.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: January 27, 1960

Card 3/3

MARKOVSKIY, L.Ya.; SAPOZHNIKOV, Yu.P.

Composition and some properties of selenic acid cadmium salts. Zhur. neorg. khim. 6 no.7:1592-1598 Jl '61. (MIRA 14:7)

1. Gosudarstvennyy institut prikladnoy khimii.
(Cadmium selenate)

29532
S/078/61/006/011/010/013
B101/B147

5 4500

AUTHORS: Sapozhnikov, Yu. P., Kondrashev, Yu. D., Markovskiy L. Ya., Omel'chenko, Yu. A.

TITLE: Study of phase composition and luminescence properties of the system ZnO - MgO, activated by chromium

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 6, no. 11, 1961, 2550-2557

TEXT On the basis of a paper by A. L. Smith (see below) who studied the luminescence of nonactivated MgO and ZnO mixtures, the authors examined the system MgO - ZnO activated with 0.5 % of Cr (added as ammonium bichromate). The mineralizer added was 3 % LiCl. Samples were produced at 1100 and 1300°C. Powder patterns were taken by a УРС-50-И (URS-50-I) apparatus. Two limited solid solutions were found: Zn(Mg)O and Mg(Zn)O with the structure of the initial components. The unity cell volume of the solid solution Mg(Zn)O increases continuously. The incorporation of Mg ions into the hexagonal structure of ZnO causes a slight increase of parameter a and a considerable decrease of parameter c; thus, the unit cell volume is reduced. The upper limits of existence of

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B101/B147

Study of phase composition and

solid solutions for Zn(Mg)O are 12 and 16 mole% of MgO, for Mg(Zn)O
26.5 and 35.5 mole% of ZnO at 1100 and 1300°C, respectively. Lumin...
was caused by cathodic excitation by means of an electron beam tube
(9 kv, 10 μa/cm^2) on 10 mg/cm^2 layers of luminophores. The spectrum
curves were taken with a UM-2 (UM-2) monochromator with a ФЭУ-17 ...
or ФЭУ-22 (FEU-22) photomultiplier, and a ГЗС-47 (GZS-47) mirror
galvanometer. Zn(Mg)O and Mg(Zn)O were found to have two radiation
ranges, a green one (maximum 530-540 mμ) and a red-infrared one ... mμ.
The red band occurs on formation of the solid Mg(Zn)O solutions, and on
formation of the luminophore MgO Cr LiCl. Its intensity increases as
the MgO content increases. The green band has its maximum at ... mμ
of ZnO, and is caused by ZnO activated with Cr. The occurrence of the
two bands is in agreement with the phase formation of solid solutions
determined by X-ray analyses. Between 76 and 74 mole% of ZnO both solid
solutions exist and both bands are visible. The stability of the ... when
bombarded with an electron beam showed that the luminescence intensity
after ... hr decreased by ... % at J_a = 4 kv, ... μa/cm^2; at ... J_a
10 μa/cm^2, the intensity decrease was 70 % after ... hr ...

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29532
S/078/6./006/011/01[illegible]
Study of phase composition and... B101/B14[illegible]

activator of ZnO and of solid Zn(Mg)O solutions. A paper by G. S. Zhdanov, V. A. Pospelov (Doki AN SSSR, 23, [illegible] is mentioned. There are 4 figures, 2 tables, and 10 references: 4 Soviet and 6 non-Soviet. The two most recent references to English-language publications read as follows: A. L. Smith, J. Electrochem. Soc., 99, [illegible]; W. A. Runciman, US Patent no. 2736712, February 28, 1956.

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: September 30, 1960

Card 3/3

88674

9.4150

S/051/61/010/002/001/003
E201/E291

AUTHORS: Markovskiy, L. Ya. and Smirnova, R. I.

TITLE: The Luminescent Properties of Gold-Activated Zinc Selenide

PERIODICAL: Optika i spektroskopiya, 1961, Vol. 10, No. 2, pp. 194-197

TEXT: The authors report a study of the photoluminescence and cathodoluminescence of ZnSe:Au. Zinc selenide was prepared from ZnS of phosphor purity and selenious acid using the "wet method". The amount of iron in the initial materials did not exceed 5×10^{-5}%; in the final product it was 0.0001%. ZnSe prepared by heating to 800°C contained zinc oxide as an impurity which was removed by treatment with a solution of $NH_4OH + NH_4Cl$. In some experiments the authors used very pure ZnSe prepared by the hydrogen selenide method (Fe, Cu, Co, Ni were present in amounts smaller than 3×10^{-5}%); zinc oxide was removed by reduction at 500°C in hydrogen. The activator was introduced in the form of gold chloride. In all cases NaCl and $MgCl_2$ were used as fluxes. The final heat treatment (30 min. at 900°C) was carried out in

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S/051/61/010/002/001/003
E201/E291

The Luminescent Properties of Gold-Activated Zinc Selenide

closed quartz crucibles either in air or in an atmosphere of purified nitrogen (less than 0.01% O_2) The cathodoluminescence parameters were obtained by placing a sample in a demountable cathode-ray tube. The cathodoluminescence was recorded with a monochromator УМ-I (UM-I) and a photomultiplier ФЭУ-22 (FEU-22). The photoluminescence was recorded with a monochromator ЗМР-3 (ZMR-3) and the same photomultiplier FEU-22. The duration of afterglow was obtained using an oscillographic method. When excited with light of 365 mμ wavelength at room temperature, ZnSe:Au exhibited a maximum which depended on the amount of gold and lay between 690 (0.005% Au) and 720 mμ (0.5% Au). This maximum was due to the activator. A slight inflection was found in the photoluminescence spectrum near 600 mμ; on cooling to -100°C the inflection turned into a prominent band which was due to ZnSe itself. At +100°C the photoluminescence spectrum had the same form as at room temperature but the intensity was generally lower because of temperature quenching. The cathodoluminescence was excited by electrons accelerated to 9kV, the electron beam density

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S/051/61/010/002/001/003
E201/E291

The Luminescent Properties of Gold-Activated Zinc Selenide

was 1 $\mu A/cm^2$. The intensity of the cathodoluminescence was compared with that of ZnSe:Cu and $Zn_3(PO_4)_2$: Mn phosphors. Beginning from gold concentrations of 0.01%, two maxima at 600 and 680 mμ were found in the cathodoluminescence spectrum. The 600 mμ maximum was depressed and the 680 mμ maximum was intensified when the amount of gold was increased. Concentration quenching of the gold-activator band occurred at concentrations greater than 0.05%. The intensity of cathodoluminescence of ZnSe:Au was close to that of ZnSe:Cu. The duration of afterglow, defined as the time when only 5% of the initial intensity remained, was about 10^{-3} sec. The long-wavelength band of the ZnSe:Au luminescence was independent of the purity of ZnSe. It was also found that this long-wavelength band was destroyed by heating in hydrogen and re-established by subsequent heating in air. A valuable property of the ZnSe:Au phosphor was the comparatively low inertia of its luminescence. Acknowledgements are made to F. M. Pekerman and O. N. Kazankin for help in some measurements. There are 3 figures, 1 table and 7 references: 1 Soviet and 6 non-Soviet.

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S/048/61/025/004/003/048
B104/B201

24 3500

AUTHORS: Markovskiy, L. Ya. and Smirnova, R. I.

TITLE: Effect of oxygen on the luminescence properties of activatorless zinc selenide

PERIODICAL: Izvestiya Akademii nauk SSSR. Seriya fizicheskaya, v. 25, no. 4, 1961, 449-453

TEXT: The present paper has been read at the 9th Conference on Luminescence (Crystal Phosphors), Kiyev, June 20-25, 1960. In view of the great importance of zinc selenide in the practice, the authors made a detailed study of the luminescence properties of activatorless zinc selenide and clarified the effect of oxygen introduction into the preparation. The latter was directly synthesized from the pure elements, applying a method by Pashinkin (Ref. 8: Pashinkin, A. S., Tishchenki, G. N. et al. Kristallografiya, 5, 261, (1960)). The preparation was free from oxygen and had a cubic lattice constant of a = 5.657 kX. The introduction of given amounts of air into the reaction zone made it possible in different preparations to achieve determined oxygen concentrations. Results are graphically

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presented in Fig. 1. Fig. 2 shows the spectral distribution of zinc selenide emission as a function of the oxygen content. It may be seen from these results that already 0.5 % O effect an appreciable shift of the maximum, while at larger amounts of ZnO, a ZnO emission becomes manifest, and a temperature drop effects in all preparations a shift of the maximum to the left. Fig. 4 shows the spectral distributions of commercial zinc selenide preparations. It may be seen from Fig. 5 that absorption is reduced in the shortwave region with an increase of the ZnO content. It may be said on the basis of data by Yu. D. Kondrashev that in the ZnSe lattice, ZnO is dissolved to 1 - 1.5 %, as only at a higher oxygen content, zinc oxide can be shown to be present in the X-ray diagram. The possibility is thus given of correlating the changes of the luminescence properties of zinc selenide at an increase of the oxygen content with the formation of a new phase, the solid solution ZnSe-ZnO. Yu. D. Kondrashev is thanked for the measurement of lattice parameters, and M. Z. Aleksandrova for her assistance in producing and analyzing the preparations. There are 5 figures and 9 references: 6 Soviet-blod and 3 non-Soviet-bloc. ~~The 3 references to English-language publications read as follows: Ref. 1: Leverenz H., Wood B., Lasof S., Shrader R., Preparation and Characteristics of Solid~~

22521

S/080/61/034/001/002/020
A057/A129

5.2400 1043, 1208, 1273

AUTHORS: Markovskiy, L.Ya., Vekshina, N.V.

TITLE: On Diborides of Alkaline Earth Metals

PERIODICAL: Zhurnal Prikladnoy Khimii, 1961, Vol. 34, No 1, pp. 16-20

TEXT: At the 3rd Conference for Physicochemical Analysis, L. Ya. Markovskiy and Yu.D. Kondrashev, ZhNKh, 2, 34 (1957), Ref.1, are quoted to have demonstrated that with reference to certain metals of the 2nd and 3rd groups of the periodical system of elements the different borides of the same metal generally decrease in chemical activity with increasing content of boron in the new boride phase. This is explained by the formation of a more stable skeleton in hexaborides. In the present work, borides of Ca, Sr, and Ba were synthesized and the hydrolysis of the obtained products was studied, including the evolution of boranes in this process. It has to be mentioned that diborides of Ca, Sr, and Ba were obtained for the first time, as claimed by the authors, while so far only the hexaborides of these elements were known. In addition to chemical analysis, x-ray analysis of the obtained products was

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On Diborides of Alkaline Earth Metals

carried out and the presence of MeB_2 (Me stands here for Ca, Sr, Ba) was determined. The pulverized metal was mixed with elemental boron (containing less than 0.1% Mg, since through chemical reaction between boron and Mg boranes can also be formed), briquetted and fired in an argon atmosphere at 900°C-1,100°C, a temperature range covering optimum temperatures for each of the three elements. The borides were analyzed. They were separated from free metal by boiling them in diluted HCl; ions of metal and boron were determined in the filtrate and borane in the gaseous phase. The borane yield from CaB_2 was 1.5-3% by weight (as compared with the total initial B), i.e., it was identical with the borane yield from the decomposition of MgB_2. Analytical data for the reaction between Ca and B are presented in Tab.2. Optimum conditions for the formation of CaB_2 are: 950°C, holding time 1 hr, Ca:B ratio = 1:2, resulting in a 45% yield of CaB_2 (the remainder is CaB_6 and some B). X-ray analysis (made by Yu.D. Kondrashev) showed the presence of the new phase of CaB_2, but the latter could not be isolated in a pure state. The results concerning the reaction between Ba, as well as Sr and B, are given in Tab.3 and demonstrate that formation of BaB_2 occurs at 1,100°C (with a yield of 20.2%) and of SrB_2 at 950°C (with a yield of 11.2%). The diborides are more easily formed if an excess of the metal is present. Formation of

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On Diborides of Alkaline Earth Metals

diborides takes place within a sharply defined temperature range, above which a dissociation into the constituent elements occurs. Simultaneously with the diborides, hexaborides are formed whose relative rate of formation increases with an increase in the atomic weight of the metal. Hence the yield of SrB_2 and BaB_2 is lower than that of MgB_2 and CaB_2. The investigated borides are easily hydrolyzed by acids with liberation of boranes in amounts corresponding to those obtained by MgB_2 hydrolysis (Tab.4). There is 1 figure, 4 tables and 8 references: 5 Soviet-bloc and 3 non-Soviet-bloc. The reference to the English-language publication reads as follows: L. Lafferty, J.Appl.Phys., 22,299 (1931).

ASSOCIATION: Gosudarstvennyy institut prikladnoy khimii (State Institute of Applied Chemistry)

SUBMITTED: June 4, 1960

Card 3/8

25382
S/080/61/034/002/001/025
A057/A129

15.2240 also 2209

AUTHORS: Markovskiy, L.Ya., Vekshina, N.V.

TITLE: On ternary compounds in the system "alkaline earth metal - boron - carbon"

PERIODICAL: Zhurnal Prikladnoy Khimii, v 34, no 2, 1961, 242-248

TEXT: In the present work preliminary investigations of ternary compounds between alkaline earth metal (especially calcium), boron, and carbon were made. The composition and formation conditions were studied to determine syntheses of pure (carbon-free) hexaborides of alkaline earth metals. These borides are of interest because of their chemical and thermal resistance and their special heat-emitting properties. In the simplest preparation method, i.e., reduction with carbon, formation of polymeric organic compounds occurs, which contaminate the product. It is demonstrated in the present investigations that formation of organic compounds is due to

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On ternary compounds ...

the presence of the above-mentioned ternary compounds in reduction products. The formation of a single compound with an approximate formula CaC_2B was also determined. The experiments were carried out by heating (1hr at 1300°C in argon atmosphere) tabletted mixtures of carbon, boron, and the respective alkaline earth metal varying the molal ratio. After heating the product was treated with water to determine MeC_2 (Me = metal) and with hydrochloric acid demonstrating the presence of organic substances by a strong exothermic reaction. The acid-soluble products ($CaCl_2$, H_3BO_3, and liquid organic substances) were separated from insoluble metal hexaborides, free boron and carbon, and solid organic substances by filtration. The primary heating product, gaseous and liquid products of hydrolysis, and the non-soluble residue, as well as the final products obtained after roasting (300°-400°C) of the solid organic substances were investigated by X-ray and/or chemical analysis. Results obtained by varying ratios of the components demonstrate (Tab. 2) that in all experiments formation of CaB_6 occurs, and formation of organic compounds is not caused by $CaCl_2$, but by another substance which hardly reacts with water and decomposes quickly with hydrochloric acid. Data obtained by hydrolytic decomposition (Tab. 3)

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On ternary compounds ...

indicate that the molal ratio Ca : C : B is 1 : 2 : 1 in the hydrolyzed product, thus the substance in question has apparently the formula of a boron carbide CaC_2B. The latter was also determined by X-ray analysis (see Tab. 2) and is called phase α by the present authors. No other boron carbides could be determined. It was observed that with increasing carbon content in the initial mixture the yield in CaB_6 decreases, while CaC_2B and CaC_2 are formed together. Increase in boron content increases CaB_6 formation and decreases correspondingly the CaC_2 and CaC_2B content. Experiments with strontium and barium were carried out in the ratio Me : C : B = 1 : 2 : 2 which was found to be the optimum ratio for calcium compositions. It can be seen from experimental results (Tab. 6) that corresponding to data for calcium a considerable amount of organic substances is formed and the formula for the ternary compound is MeC_2B. Preliminary results concerning properties of the organic compounds demonstrate that with acid decomposition of boron carbides metal chlorides, boric acid and liquid non-saturated hydrocarbons with open chain are formed. These hydrocarbons do not contain acetylene triple bonds, but a non-saturated

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AC57/A129

double bond. With continuing polymerization the main part of liquid organic substances changes into solid substances. The composition of organic substances depends on conditions of hydrolysis, but the carbon/hydrogen ratio remains approximately 1 : 2. The organic substances are best soluble in tetrahydrofurane and acetone. Infrared spectral analyses demonstrated that the liquid and solid polymers contain CH_2- and CH- groups in the open chain. Addition of H_2O_2 to the liquid polymers effects (similar to butadiene polymerization) formation of a white flocculent precipitate. It can be assumed that the liquid products of hydrolysis of boron carbides contain two double bonds, but composition and properties of these organic substances have to be investigated in further experiments. The authors thank Yu.D. Kondrashev for taking the X-ray patterns in the present investigations. There are 7 tables and 6 references: 3 Soviet-bloc and 3 non-Soviet-bloc. The references to the English-language publications read as follows: P. McKenna, Ind. Eng. Chem., 28,767 (1936), H. Blumenthal, Powder Metall. Bull., 7,79 (1956).

SUBMITTED: September 26, 1960